FLOOD PLAIN MANAGEMENT STUDY

FOR

HABERSHAM COUNTY, GEORGIA

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

MARCH, 1986

FLOOD PLAIN MANAGEMENT STUDY

for

HABERSHAM COUNTY, GEORGIA

Prepared Under A
Joint Coordination Agreement

With

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

By

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Athens, Georgia

In Cooperation With

HABERSHAM COUNTY

and

UPPER CHATTAHOOCHEE RIVER SOIL AND WATER CONSERVATION DISTRICT

MARCH 1986

CONTENTS

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

INTRODUCTION

The Board of Commissioners requested a flood plain management study (FPMS) in order to obtain detailed information for use in developing an effective flood plain management program. The Upper Chattahoochee River Soil and Water Conservation District (S&WCD), as co-sponsor, forwarded the request to SCS. The Georgia Department of Natural Resources (DNR) reviewed the request and concurred in the need for the FPMS. DNR assisted in scoping, along with the county and S&WCD. Habersham County provided assistance throughout the study, which included providing public information, acquiring access permits for field surveys, and supplying survey crew members. The Upper Chattahoochee River S&WCD assisted in the public information program.

SCS assists State agencies and communities in the development and implementation of their flood plain management programs by carrying out cooperative FPMS under authority of Section 6 of Public Law 83-566. Studies are made in accordance with Executive Order 11988 and Federal Level Recommendations 3 of "A Unified National Program for Flood Plain Management."

Field surveys of valley cross sections and road crossings represent conditions as of November 1985. Peak discharges were computed using a frequency analysis of the stream flow at the U.S. Geological Survey gaging station on Soque River near Demorest. Flood profiles have been computed using two SCS computer programs, WSP-2 and Dam Breach Routing (Appendix C).

STUDY AREA DESCRIPTION

Hazel Creek and tributaries are located near the center of Habersham County, and flow southwesterly into Soque River, a tributary of the Chattahoochee River. (Hydrologic Unit 03130001)

The study reaches are within the Piedmont province, an area characterized by moderate to steep slopes. Flood plains are generally narrow. The drainage area at the downstream study limit on Hazel Creek is approximately 28 square miles. (Selected drainage areas are tabulated in Appendix B).

A detailed study has been made for about 16.5 miles of Hazel Creek and tributaries. There are four floodwater retarding structures built as a portion of the P.L. 566 Hazel Creek Watershed. A breach study was made for these dams, and the dam breach flood profiles are shown where they exceed the 500-year flood profile (Appendix A).

Mud Creek and Little Mud Creek are located in the southern portion of Habersham County. Both flow southwesterly and are tributaries to the Chattahoochee River. Topography of the area is undulating or gently rolling. Flood plains are generally narrow. About 23 miles of stream were studied in detail. The drainage areas at the downstream study limits on Mud Creek and Little Mud Creek are 14 square miles and 15.8 square miles, respectively.

The upland soils in the study area are residual, being the products of weathering of the underlying schists, gneisses, and granites. Predominant soil types are Cecil, Pacolet, Madison, and Louisburg. These soils are gently sloping to steep, well drained, acid soils. Flood plain soils are predominantly Chewacla, Congaree, Wehadkee, and Altavista. These soils are level to gently sloping, and are poorly drained to moderately well drained. Most flood plains have been cleared for agriculture, however, much formally cultivated land is now idle or in woods.

The mean annual temperature is 58 degrees F, varying from a mean of 40 degrees in January to 75 degrees in July. The average freeze-free period is about 210 days extending from early April to late October. Precipitation averages 61 inches annually and varies from 3.6 inches in October to 7.2 inches in March.

NATURAL VALUES

Native tree species associated with the soils of the flood plains consist of sweet gum, ash, elm, alder, oak, sycamore, yellow popular, maple, and river birch. Understory vegetation consist of such plants as viburnum, rhododendron, mountain laurel, smilax, honeysuckle, wild azalea, hydrangea, sweet shrub, and dogwood.

Type I wetlands occur within the flood plains of all streams. A few acres of Types 3 and 4 wetlands are present in the Mud Creek and Little Mud Creek portions of the study area.

Endangered and threatened plants and animals that may occur are: American peregrine falcon, Indiana bat, red-cockaded woodpecker, southern bald eagle, and yellow lady's slipper.

Water quality in some stream reaches is adversely impacted due to the practice of clearing flood plains to the creek banks. Sediment from cropland and streambank erosion enters the streams. Other reaches, where flood plains are not cleared and where corridors of vegetation line the streams, enjoy better water quality.

Emphasis should be given to the establishment of stream corridors in areas along the streams where vegetation is lacking. This would involve permitting native vegetation to become established along the stream channels in cropland and pastureland areas. The major impact of these corridors would be to improve water quality and fish habitat by decreasing stream temperatures and reducing the amount of sediment and other pollutants reaching the streams.

All streams in the study area are classified as warm water streams. Fish species present include largemouth bass, spotted bass, bluegill and redbreast sunfish, shiners, suckers, and bullhead catfish.

Prime farmland accounts for about 8800 acres, almost 5 percent, of the county. Within the study area flood plain there are about 200 acres of prime farmland. Most is in narrow bands adjacent to the streams, and is distributed throughout the study area.

Flood plains are usually the topographic areas most likely to contain significant buried aboriginal and historical sites, and are considered culturally sensitive. Investigations to identify presently unknown archaeological and historical sites should be considered a part of land use planning.

FLOOD PROBLEMS

The most damaging flood in recent years occurred on May 29, 1976. Damages from this flood, estimated to be a 50-year frequency event, were primarily to agricultural land, and roads and bridges. Agricultural damages consist of losses of crops and pasture, sediment and scour damages, stream bank erosion, fence damage, and disruption of conservation measures. Some 4500 acres were damaged throughout Habersham County. Total damages were estimated to be $275,000.

The 100-year flood which can be expected to occur in the future will inundate 1510 acres in the study area. This acreage reflects the inpacts of four floodwater retarding structures in the Hazel Creek portion. Current farmland in the flood plain is shown in Table 1. Flood hazard areas for the 100-year and 500-year or dam breach floods are shown on the photomaps presented in this report. No buildings are within the 100-year flood hazard area.

TABLE 1 - FLOOD HAZARD AREAS

Habersham County, Georgia

Stream	100-Year Flood Plain (Acres) Farmland	Other	Total
Hazel Creek and Tributaries	460	190	650
Mud Creek, Little Mud Creek and Tributaries	300	560	860
Total	760	750	1,510

EXISTING FLOOD PLAIN MANAGEMENT

Habersham County is presently enrolled in the emergency phase of the National Flood Insurance Program and has Federal Emergency Management Agency (FEMA) flood hazard boundary maps. These maps are of a general nature, and their use is in specific regard to federally subsidized construction. An ordinance has been adopted which requires buildings, subdivisions, and water and sewage facilities to be located so as to minimize flood damages. This ordinance complies with the requirements of FEMA criteria for the National Flood Insurance Program.

The county has adopted a sediment and erosion control ordinance. Any major land disturbing activity must receive a permit. Permits are not issued until an adequate erosion control plan is designed by the developer. These plans are to be reviewed by the Upper Chattahoochee River Soil and Water Conservation District for technical feasibility and concurrence with accepted erosion control standards. Procedures for carrying out the ordinance comply with provisions of the Georgia Erosion and Sedimentation Act.

FLOOD PLAIN MANAGEMENT ALTERNATIVES

Proper management of the flood plain can minimize flood damages in most flood hazard areas. Several alternatives are available which could be implemented by Habersham County to improve management of the flood plains. The alternatives are discussed in this section.

Maintain Present Condition - The present condition, with the chance for future development within the flood hazard areas, could lead to intensified flood damage problems. Intensity and frequency of flooding may increase due to increased runoff from uplands undergoing land use changes of urbanization. New developments may occur in the flood plain and, of course, be subject to flooding.

Land Treatment - Vegetation protects the soil from the impact of raindrops, and the root system binds the soil, thus reducing erosion. Conservation land treatment practices can be applied to bare and poorly vegetated areas to reduce runoff, erosion, and sediment delivery to stream channels. Adequate vegetative cover reduces runoff and erosion by allowing rainfall to penetrate open spaces around roots and to be absorbed by plant roots. Additional water is stored in the layer of humus formed by decaying organic matter. Some of this water is put into the atmosphere by plant evapotranspiration, thus reducing runoff.

Many of the critical areas in the study area are unpaved roads and jeep trails, many on very steep slopes, and roadbanks. Other critical areas are idle land and abandoned pastures. Application of the proper management practices (e.g. tree and grass planting, lime and fertilizer application) may reduce runoff and sediment from these areas.

Sediment deposited in the stream reduces channel capacity, thereby increasing the amount of flooding. The current ordinances regarding sediment and erosion control have been an important means for controlling sediment from new construction sites. As construction accelerates, it will become more important to enforce these ordinances in order to minimize the amount of sediment reaching the streams.

As land use in the uplands changes from agricultural or forest to urban, the ensuing concentration of buildings, paved parking lots, roads, and other impervious surfaces will increase the amount and rate of runoff. This will result in more severe flooding in the flood plain. Wise land use management of the uplands can be an important step toward controlling flooding on the lowlands.

Non-structural Measures - Non-structural measures are flood protection measures which are usually applied to individual buildings, differing from the conventional structural flood protection methods such as dikes and dams which are commonly designed to protect groups of buildings. Non-structural measures include land use regulations, flood insurance, floodproofing, and relocation. They may be used to alleviate the impact of existing flooding and to reduce susceptibility to future flooding. Most likely a combination of alternatives will be necessary to achieve the desired results.

Land use regulations can be used to effectively reduce future susceptibility. By providing direction to growth and change, regulations are well suited to preventing unwise flood plain occupancy. Wise land use should also be applied to areas other than flood plains. Increased rates of runoff caused by impervious surfaces such as parking lots, roads, and roofs will cause more frequent and severe flooding in the Mud Creek flood plains. Consideration should be given to measures designed to reduce or delay runoff. (Examples of such measures may be found in reference source 13 listed on page 4 of Appendix C).

Habersham County is currently enrolled in the emergency phase of the National Flood Insurance Program and has realized the importance of detailed flood plain data to the implementation of an effective flood plain management program. The flood plain data presented in this report is sufficient for use in preparing and implementing an effective program, and may be used to enroll in the regular phase of the National Flood Insurance Program.

The flood hazard area photomaps which follow this section can be used to identify the 100-year and 500-year or dam breach flood hazard areas.

Flood profiles for the 10-year, 50-year, 100-year, and 500-year or dam breach floods are presented in Appendix A. Also shown are the locations of surveyed cross sections and road crossings.

To estimate the flood elevation at a specific site location, the following procedure is suggested:

1. Locate the site on the appropriate photomap sheet.

2. Scale the distance from the site to the nearest cross section.

3. Locate the cross section on the appropriate flood profile sheet (Appendix A); then plot the site the measured horizontal distance from the cross section. Flood elevations at the site can now be read vertically.

The on-ground mean sea level (MSL) elevation of the site should be determined by an acceptable survey procedure. Elevation reference marks (bench marks) are shown on the photomaps and are described in Appendix D.

Structural Measures - Other than the four floodwater retarding structures built in the Hazel Creek Watershed, there are no identified, feasible flood protection structures in the study area.

It is important to emphasize that even though the flood plains downstream from the Hazel Creek Watershed dams are flooded less often than before, much of that flood plain is still inundated by the 100-year flood. Additionally, any development within the dam breach flood hazard area may cause any of these dams to be classified by the State of Georgia as Category I (probable loss of life in the event of dam failure). Wise land use planning may prevent additional dams from being classified Category I.

Preservation of Natural Values - Serious consideration should be given to preservation of wetlands, unique areas, undeveloped flood plains, and bluffs adjacent to the streams which have high values for education, recreation, natural water treatment, ground water recharge, and moderation of floods.

The flood plain moderates flooding by providing an area where floodwater can spread out and be temporarily stored. Vegetated flood plains slow the rate at which incoming overland flow reaches the channel. Such practices as clearing, compacting, paving, filling, and building within the flood plain can cause increased flood elevations and frequencies. The adverse impact of this increased flooding must be considered. By maintaining the natural floodwater carrying capacity of the flood plain, many future flood problems may be avoided.

Encouragement of stream corridors or greenbelts along both sides of these creeks, particularly areas used for urban, pasture, and crops, will help reduce sediment loads in the streams. This greenbelt of stream corridor should be 50 to 100 feet wide landward from the top of each streambank. This would maintain riparian vegetation, prevent bank erosion and collapse, avoid accelerated sedimentation of the creeks, and maintain habitats for living resources--particularly fish and wildlife.

Preservation of archaeological and historical sites should be considered a part of land use planning.

PHOTOMAP INDEX

AND

FLOOD HAZARD AREA PHOTOMAPS

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

VICINITY MAP

BASE LEGEND
- DIVIDED HIGHWAY
- PRIMARY ROADS
- SECONDARY ROADS
- U.S. HIGHWAY
- STATE HIGHWAY
- INCORPORATED TOWN
- RAILROAD
- PUBLIC LAND
- DRAINAGE
- COUNTY BOUNDARY

LEGEND
- STREAM CHANNEL
- 1 SHEET COVERAGE

Lake Habersham
Hazel Cr
Soquee River
Demorest
Demorest Lake
Law Creek
No. 19 Pond
No. 12 Pond
No. 21 Pond
No. 7 Pond
Cackleberry Creek
Little Hazel Creek
Hazel Creek
Pink Dill Branch
Camp Creek
Low Lick Creek
Mud Creek
Little Mud Creek
S Fork Little Mud Creek
Alto Creek
Little Alto Creek
Chattahoochee River
WHITE COUNTY
HABERSHAM COUNTY
BANKS COUNTY
STEPHENS COUNTY
RABUN COUNTY
Cornelia
Mount Airy
Baldwin
Alto
Lake Russell
Nancy Town Lake
CHATTAHOOCHEE NATIONAL FOREST
SOUTHERN RAILWAY
34° 35'
34° 30'
83° 35'
83° 30'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

PHOTO MAP INDEX
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
GEORGIA

SCALE 0 1 2 MILES
0 1 2 3 KILOMETERS
APPROXIMATE

SOURCE
1982 GENERAL HIGHWAY MAP
TRANSVERSE MERCATOR CONFORMAL PROJECTION.

APRIL 1985 BASE 4-R-39129

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 1 OF 29

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SOIL CONSERVATION SERVICE
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FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

MUD CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

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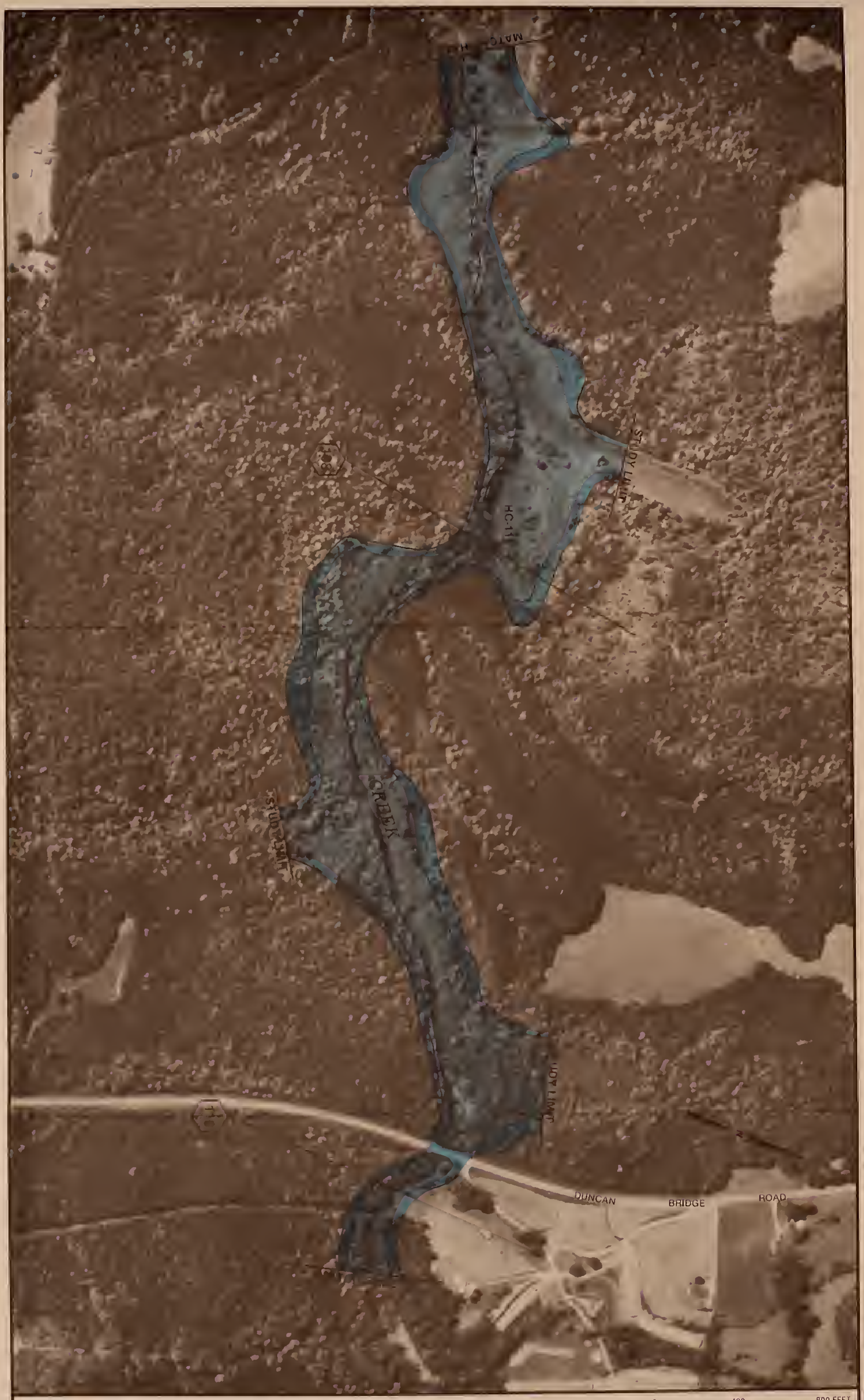
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

MUD CREEK



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
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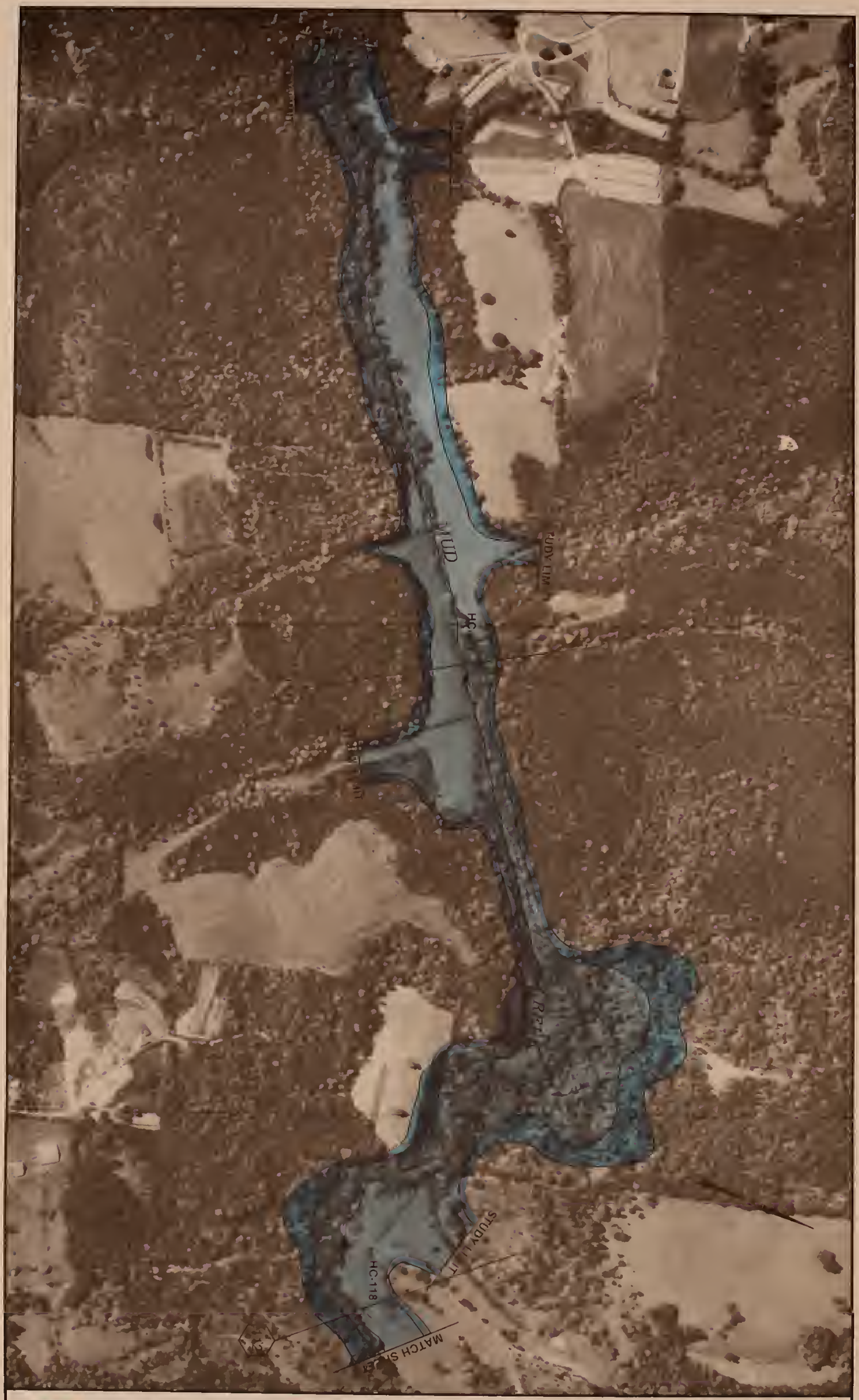
FLOOD HAZARD AREA

MUD CREEK



LEGEND

100 Year Flood Hazard Area

500 Year or Dam Breach Flood Hazard Area

Elevation Reference Marks

Cross Section Location

Stream Channel

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FLOOD HAZARD AREA

MUD CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

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FLOOD HAZARD AREA

MUD CREEK AND SOUTH FORK MUD CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

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FLOOD HAZARD AREA

MUD CREEK

LEGEND

100 Year Flood Hazard Area

500 Year or Dam Breach Flood Hazard Area

Elevation Reference Marks

Cross Section Location

Stream Channel

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FLOOD HAZARD AREA

MUD CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
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FLOOD HAZARD AREA

SOUTH FORK MUD CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
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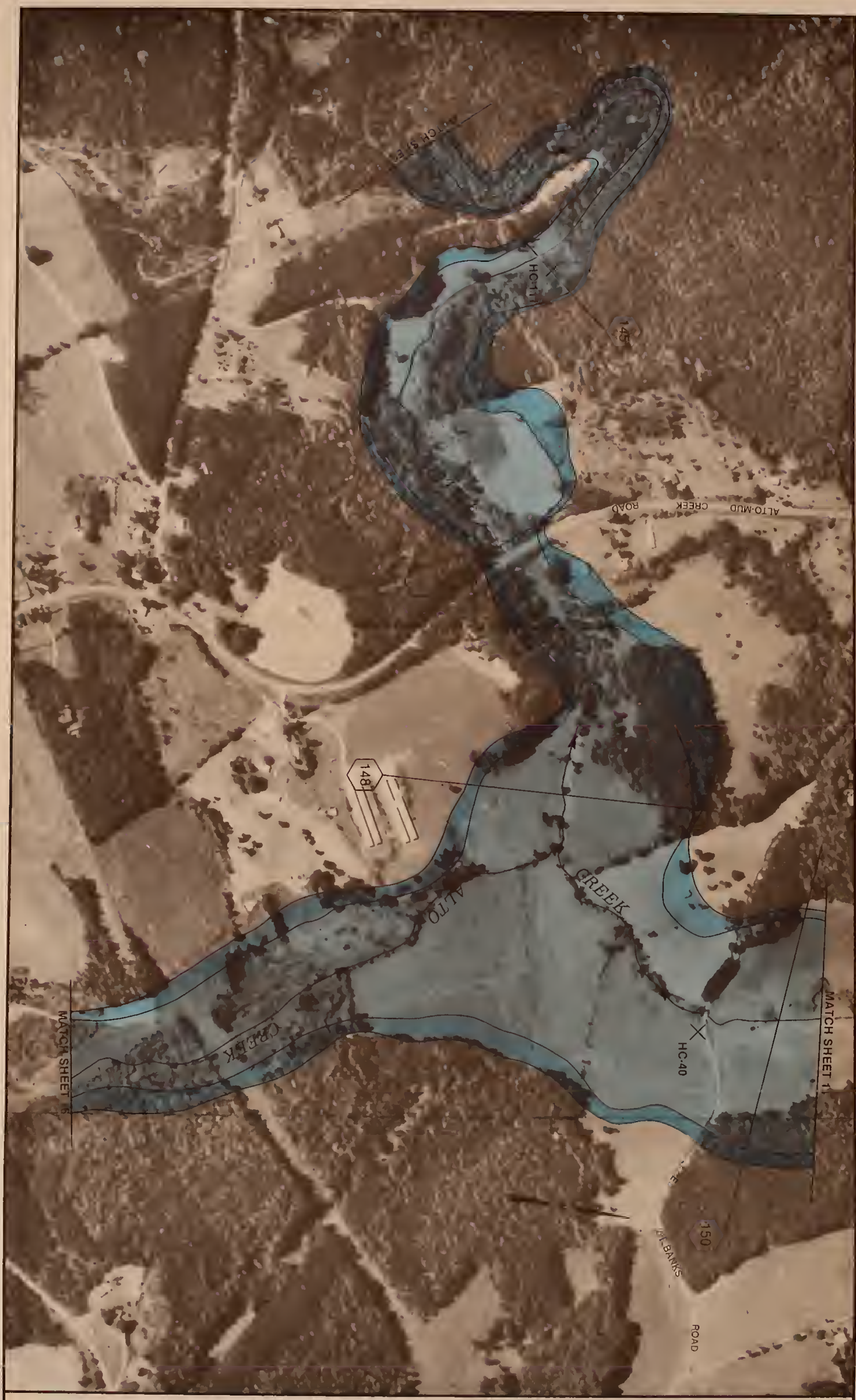
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

LITTLE MUD CREEK



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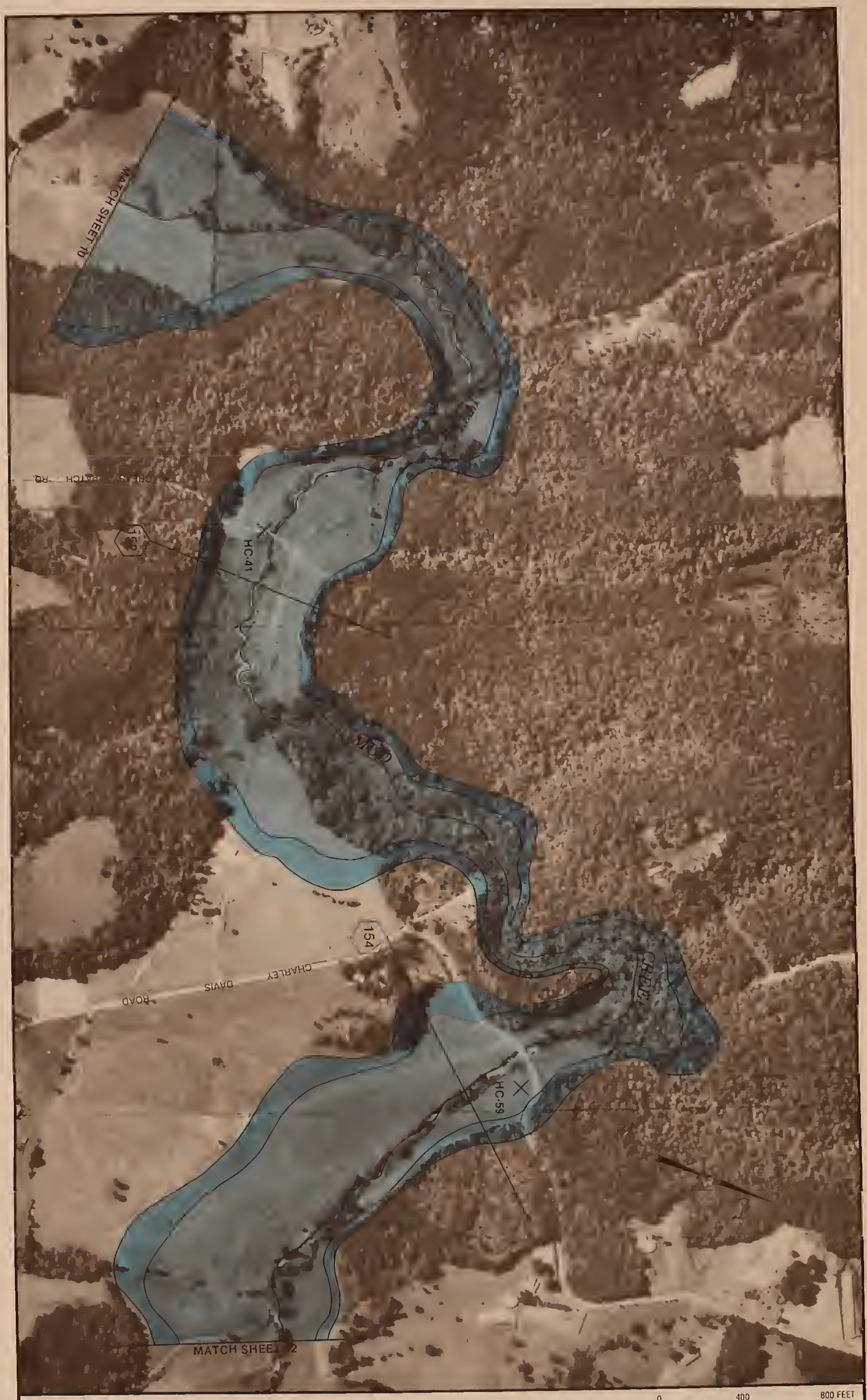
FLOOD HAZARD AREA

LITTLE MUD AND ALTO CREEKS



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FLOOD HAZARD AREA

LITTLE MUD CREEK

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FLOOD HAZARD AREA

LITTLE MUD AND SOUTH FORK LITTLE MUD CREEKS

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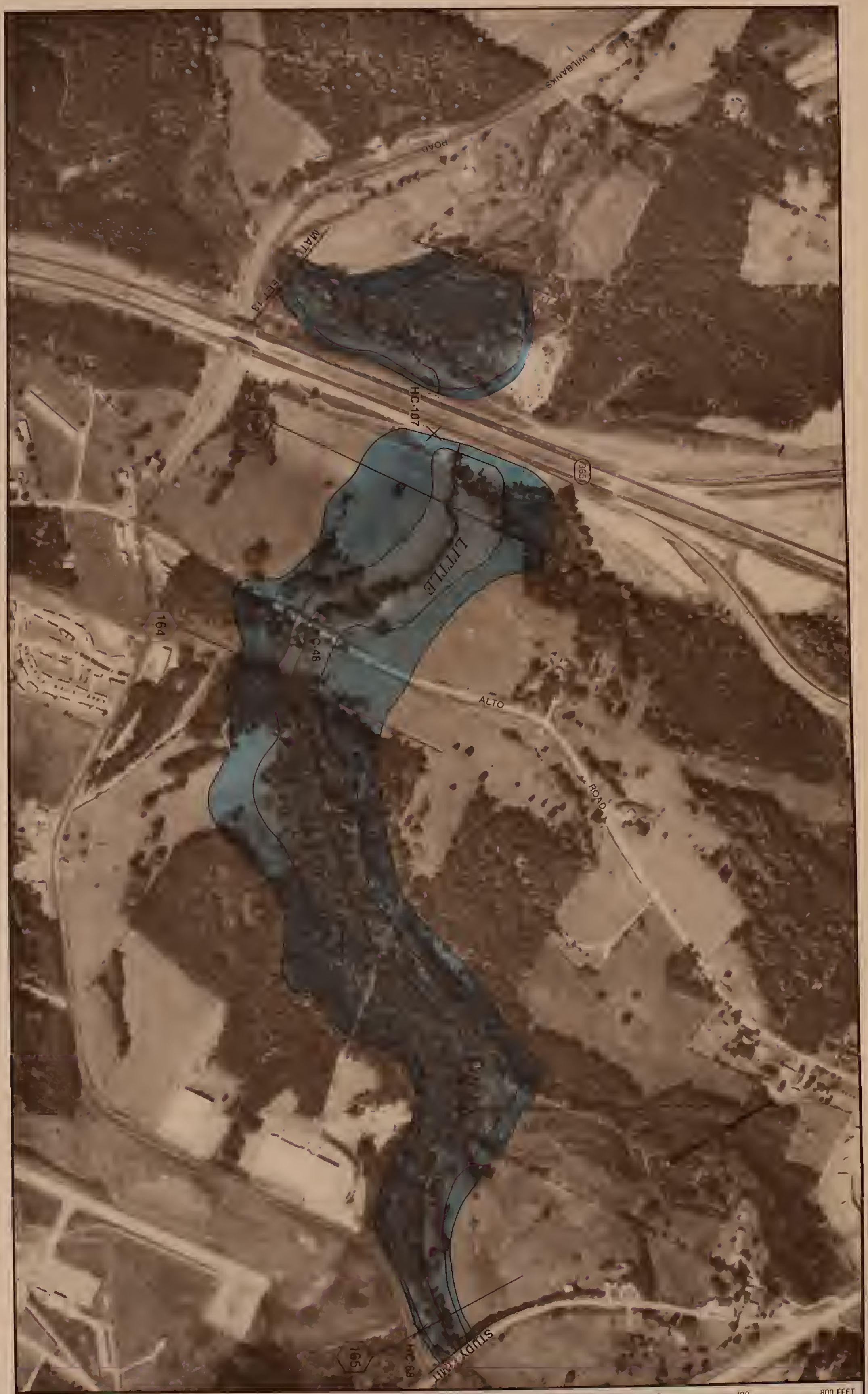
FLOOD HAZARD AREA

LITTLE MUD AND SOUTH FORK LITTLE MUD CREEKS



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FLOOD HAZARD AREA

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FLOOD HAZARD AREA

SOUTH FORK LITTLE MUD CREEK

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HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

ALTO CREEK

Fold-out Placeholder

This fold-out is being digitized, and will be inserted at a future date.

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 17 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

ALTO CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

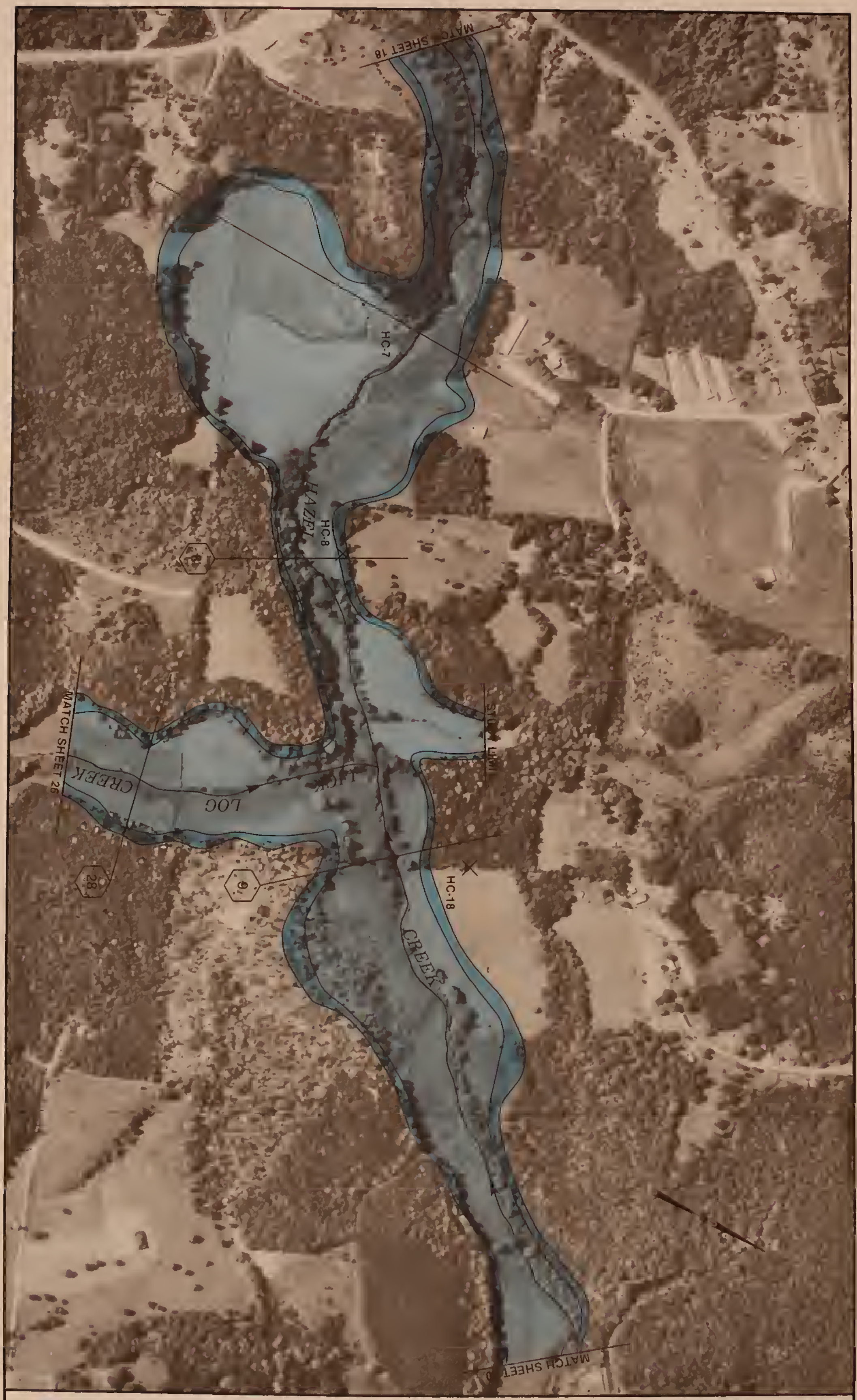
USDA Photography 10-80

SHEET 18 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

HAZEL AND CAMP CREEKS



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 19 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

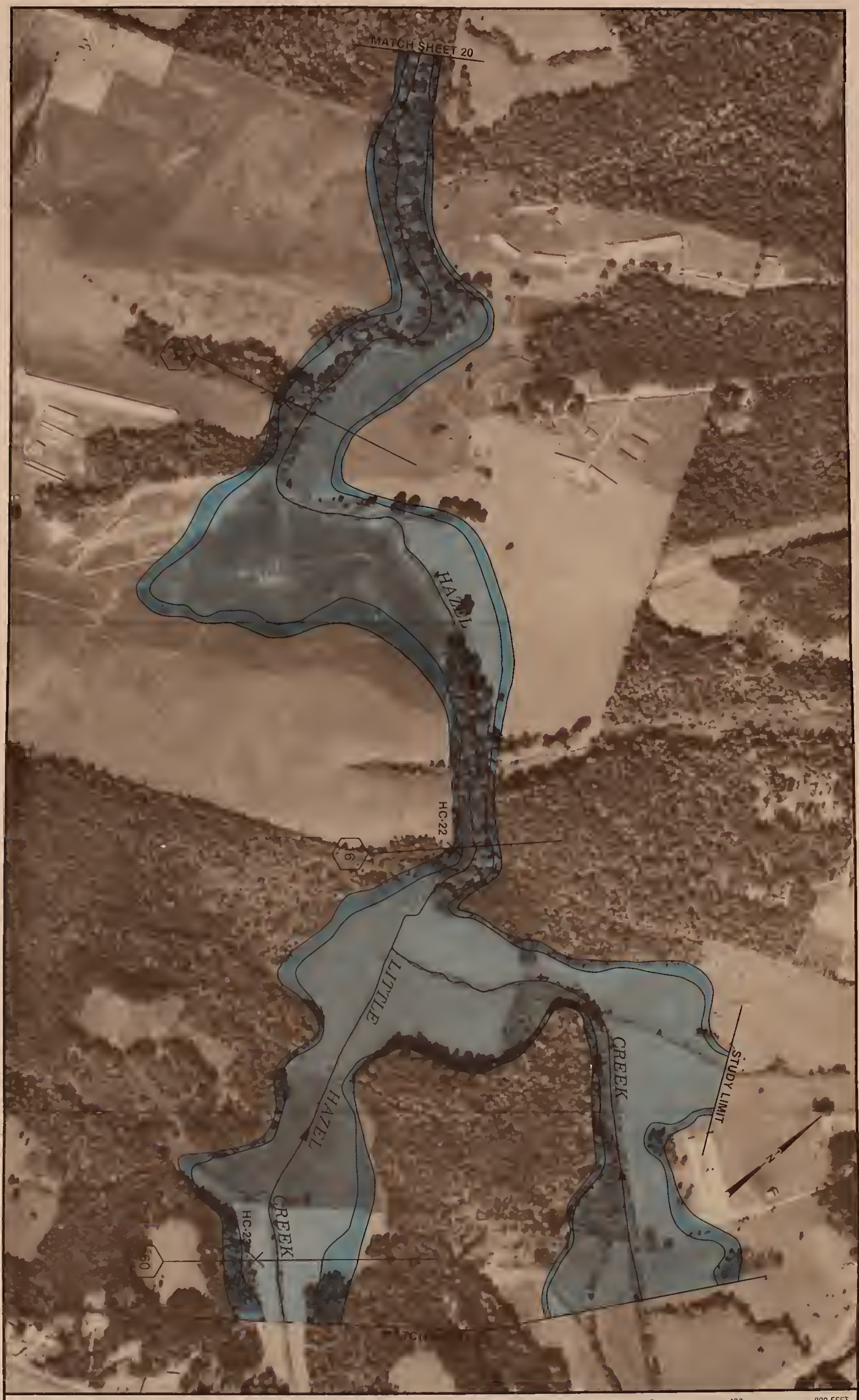
HAZEL AND LICK LOG CREEKS

SHEET 20 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

HAZEL AND LAW CREEKS



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

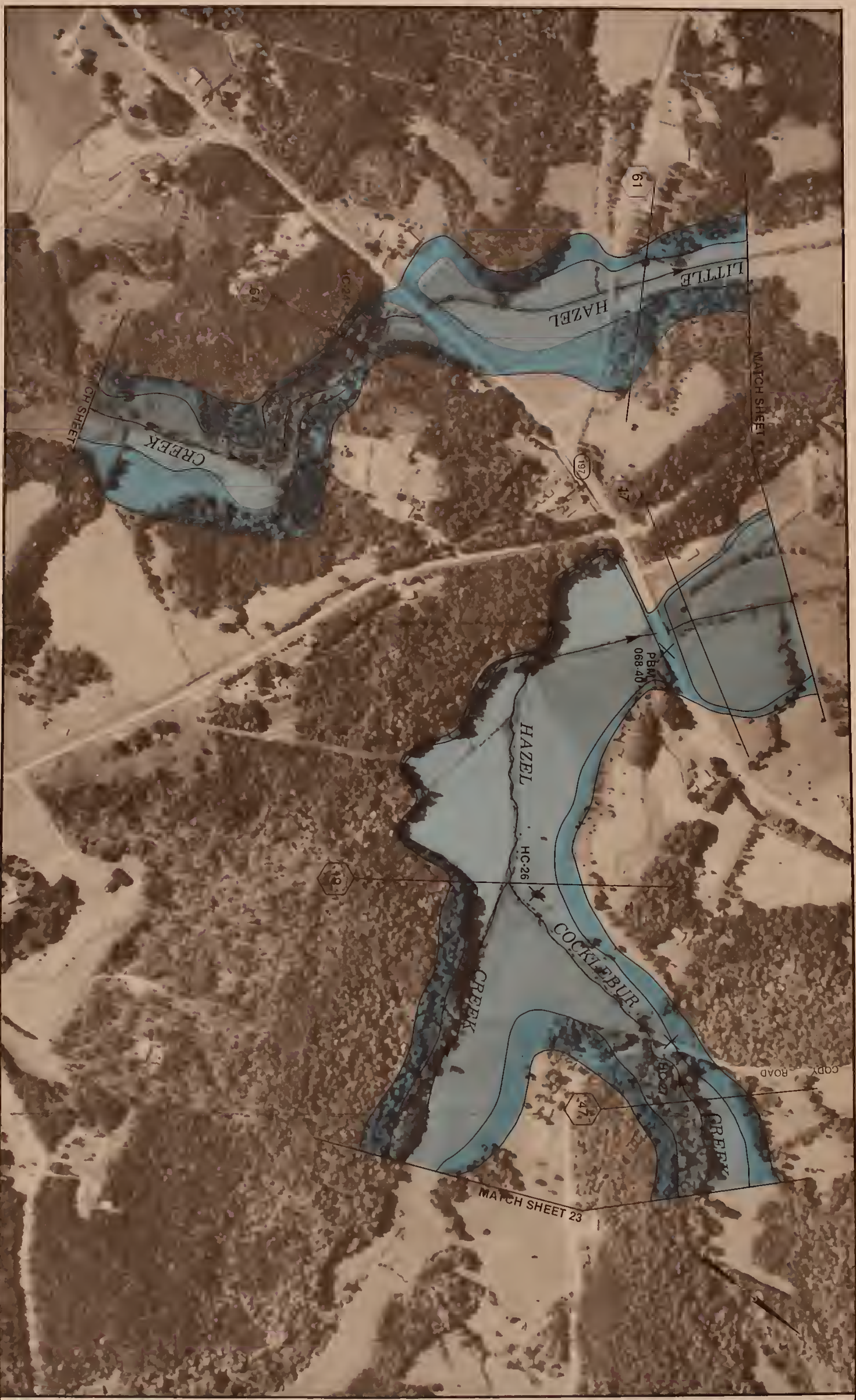
USDA Photography 10-80

SHEET 21 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

HAZEL AND LITTLE HAZEL CREEKS



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

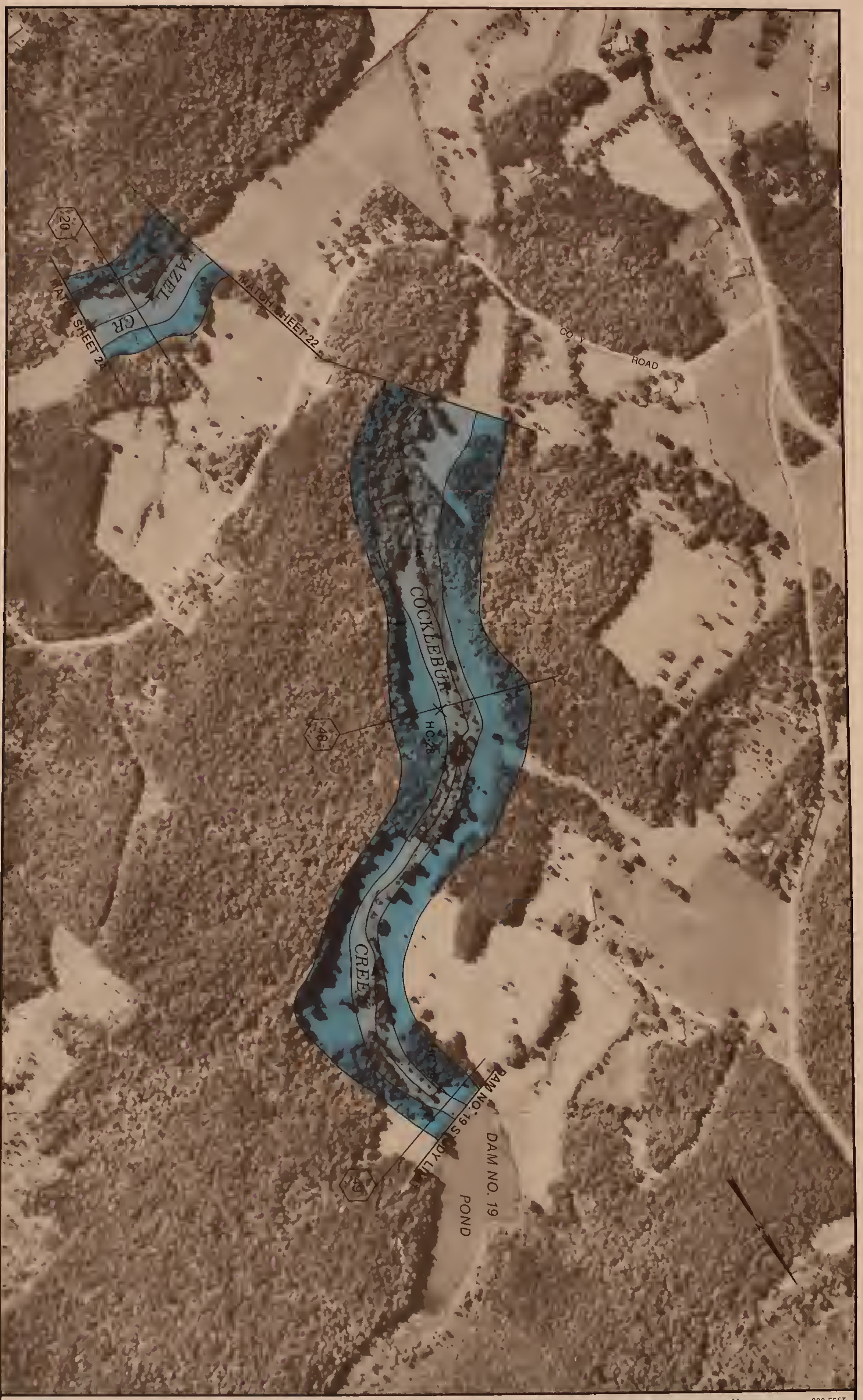
USDA Photography 10-80

SHEET 22 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

HAZEL, LITTLE HAZEL AND COCKLEBUR CREEKS



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 23 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

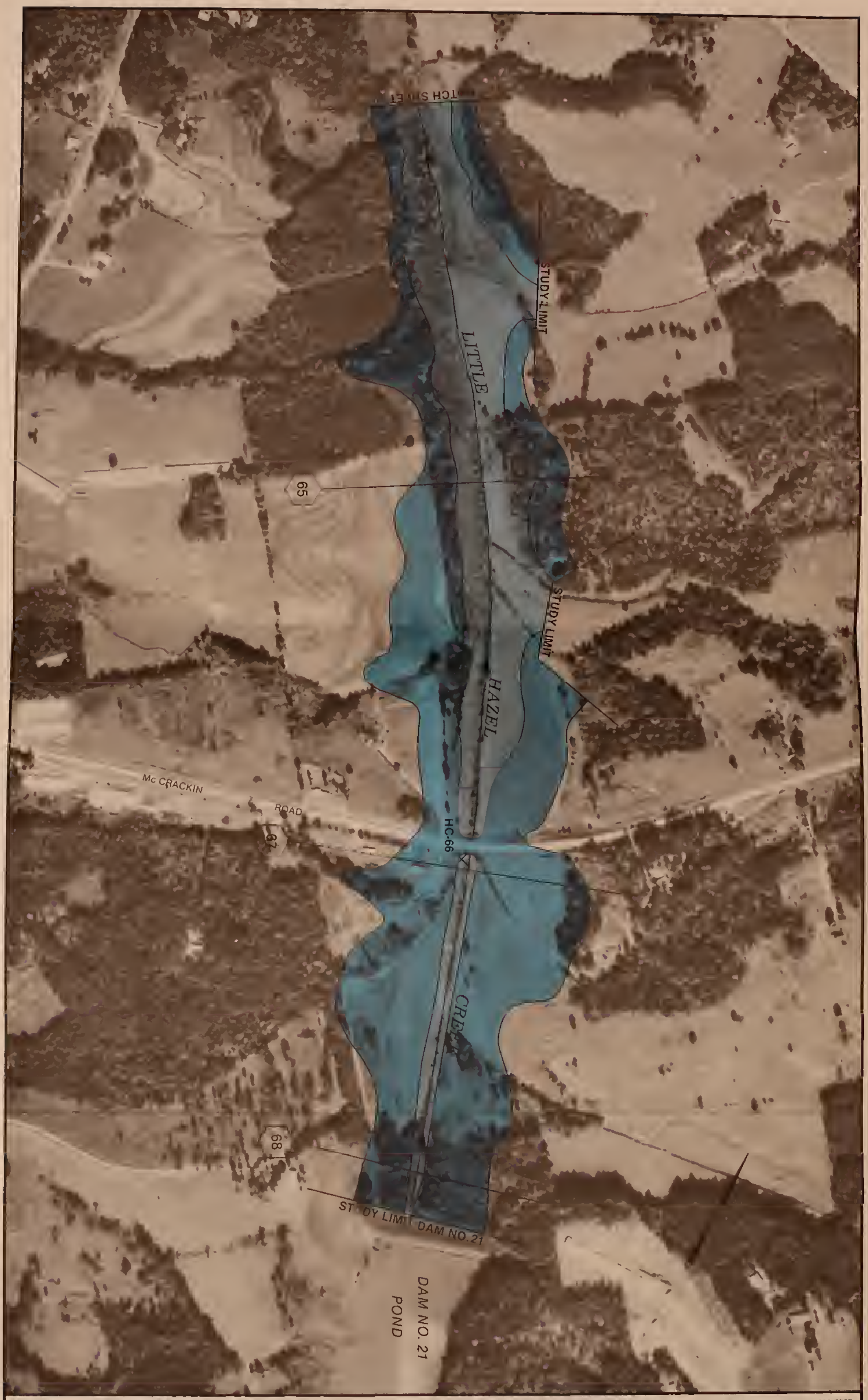
HAZEL AND COCKLEBUR CREEKS

SHEET 24 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

HAZEL CREEK



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

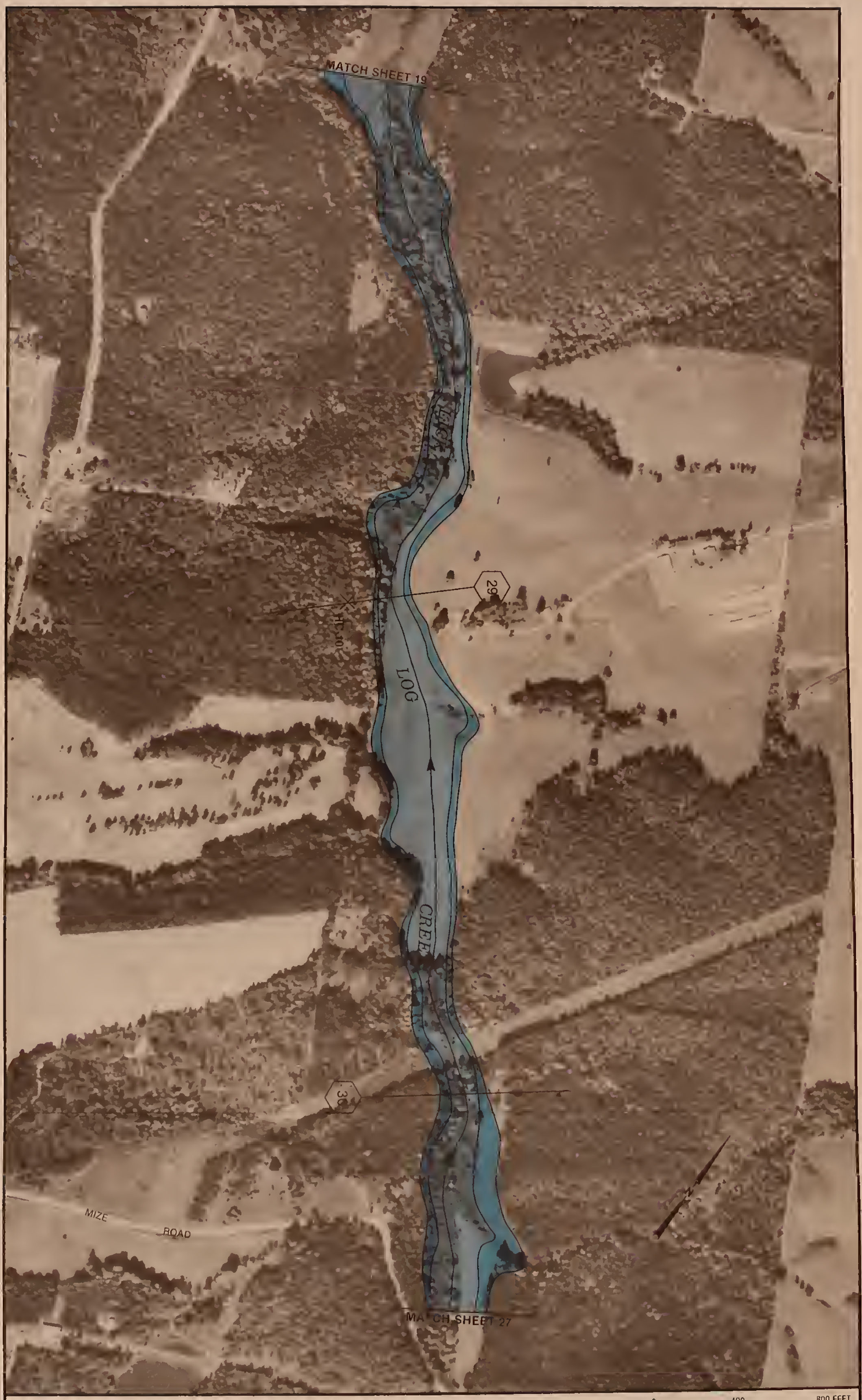
USDA Photography 10-80

SHEET 25 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

LITTLE HAZEL CREEK



LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 26 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

LICK LOG CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 27 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

LICK LOG CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- × Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

SHEET 26 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD HAZARD AREA

CAMP CREEK

LEGEND

- 100 Year Flood Hazard Area
- 500 Year or Dam Breach Flood Hazard Area
- Elevation Reference Marks
- Cross Section Location
- Stream Channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

USDA Photography 10-80

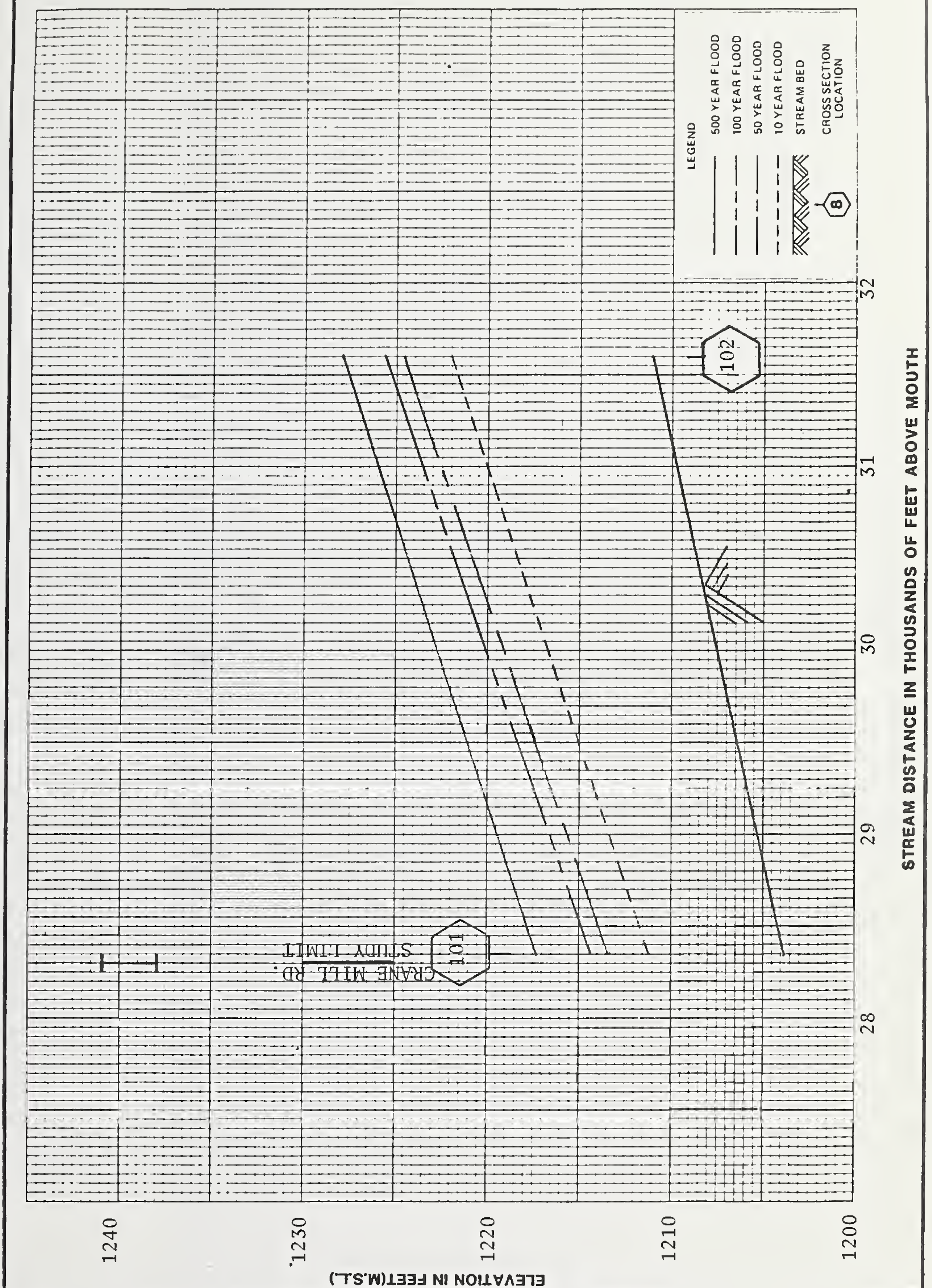
SHEET 29 OF 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
HABERSHAM COUNTY
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

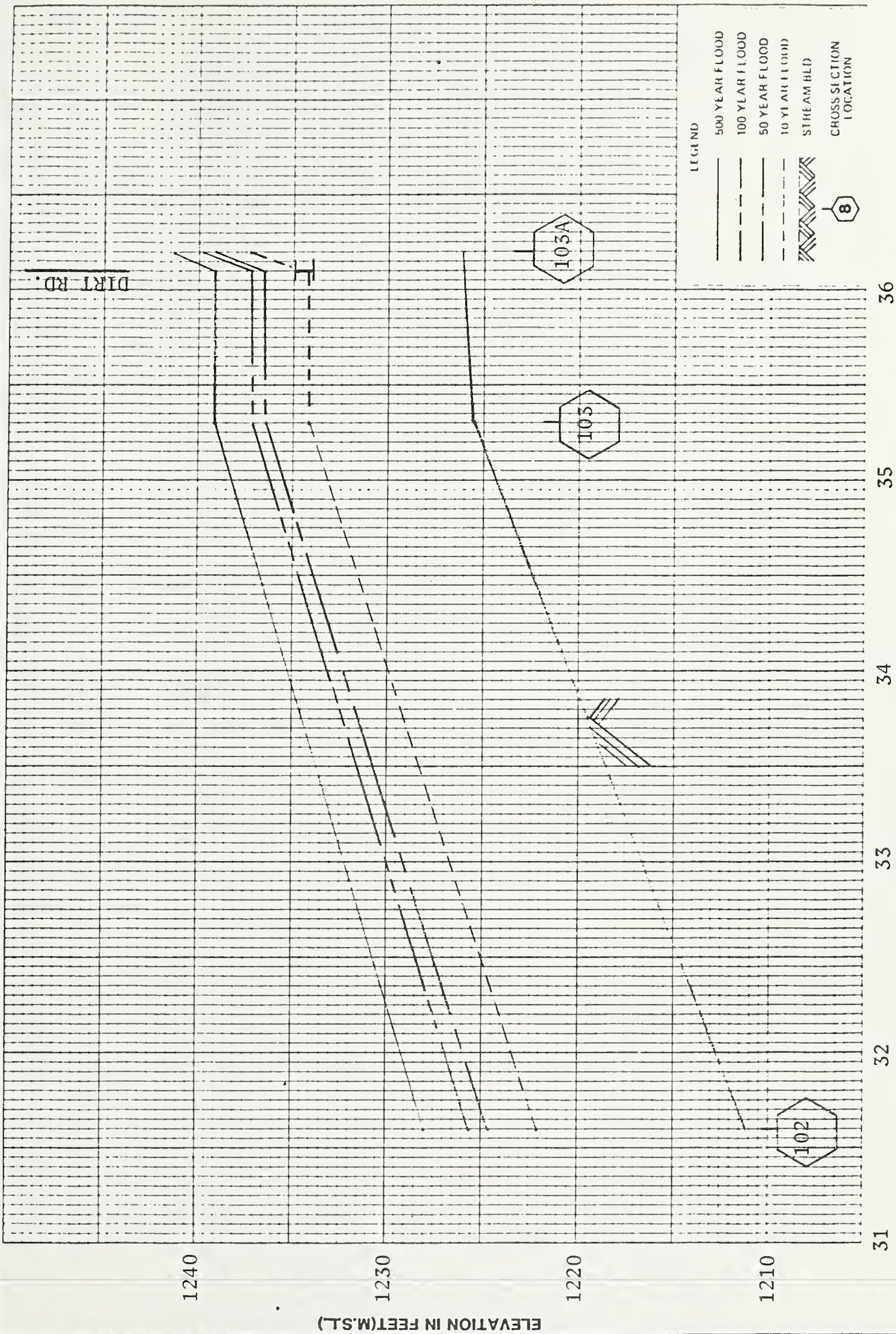
FLOOD HAZARD AREA

CAMP CREEK

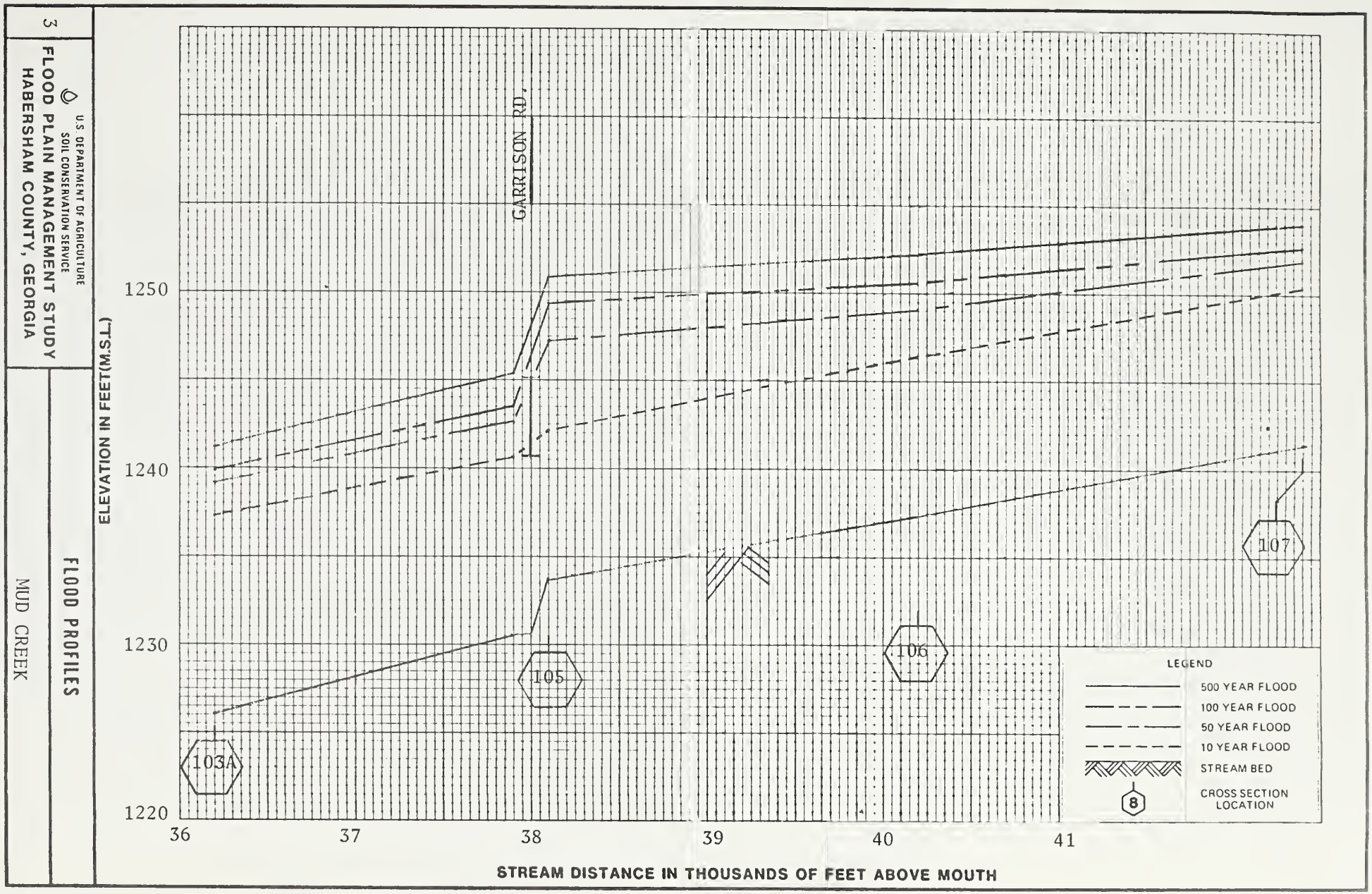
APPENDIX A



1	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



2	U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK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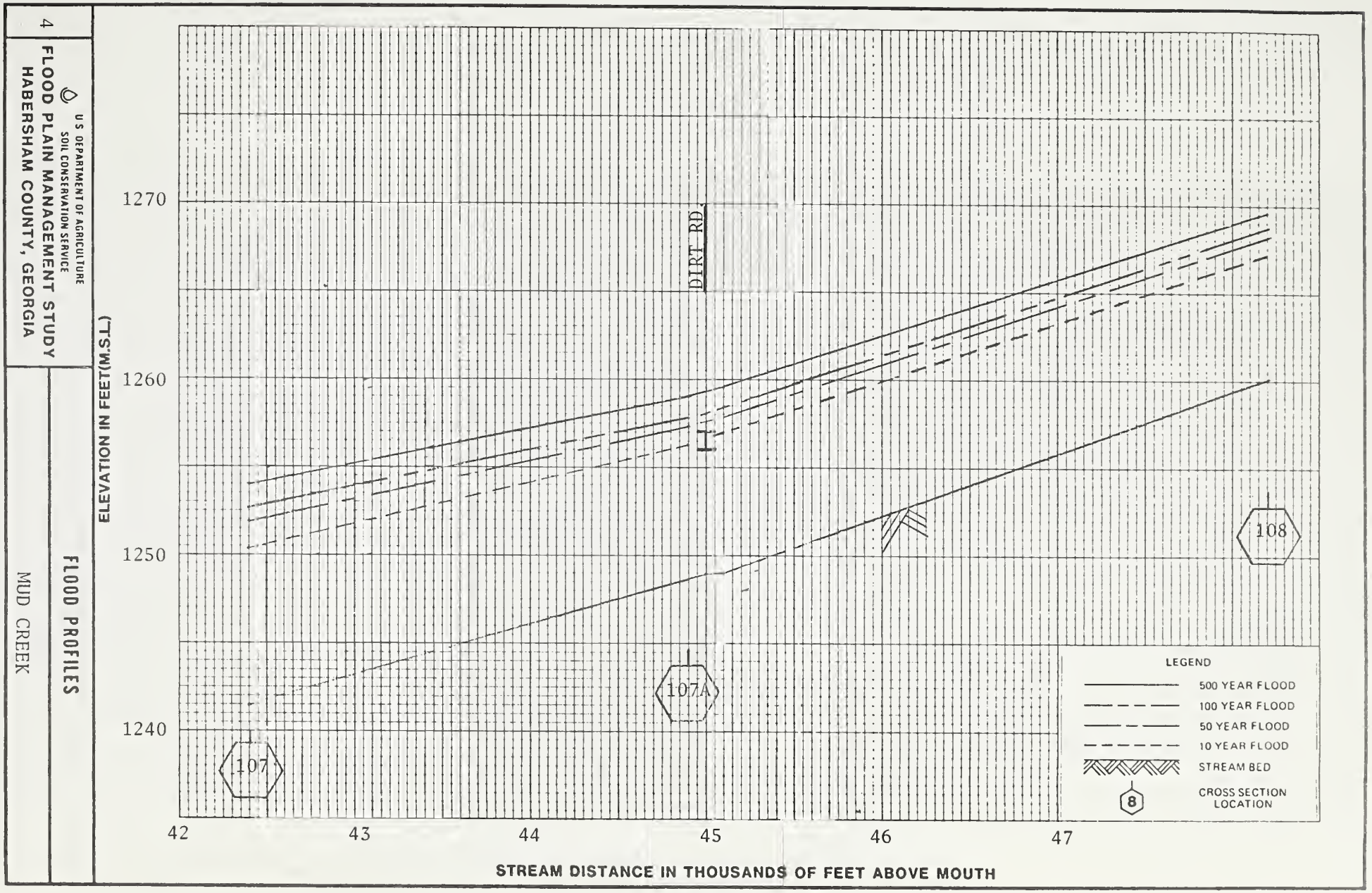
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
MUD CREEK
ELEVATION IN FEET(M.S.L.)
1250
1240
1230
1220
36
37
38
39
40
41
GARRISON RD.
103A
105
106
107
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH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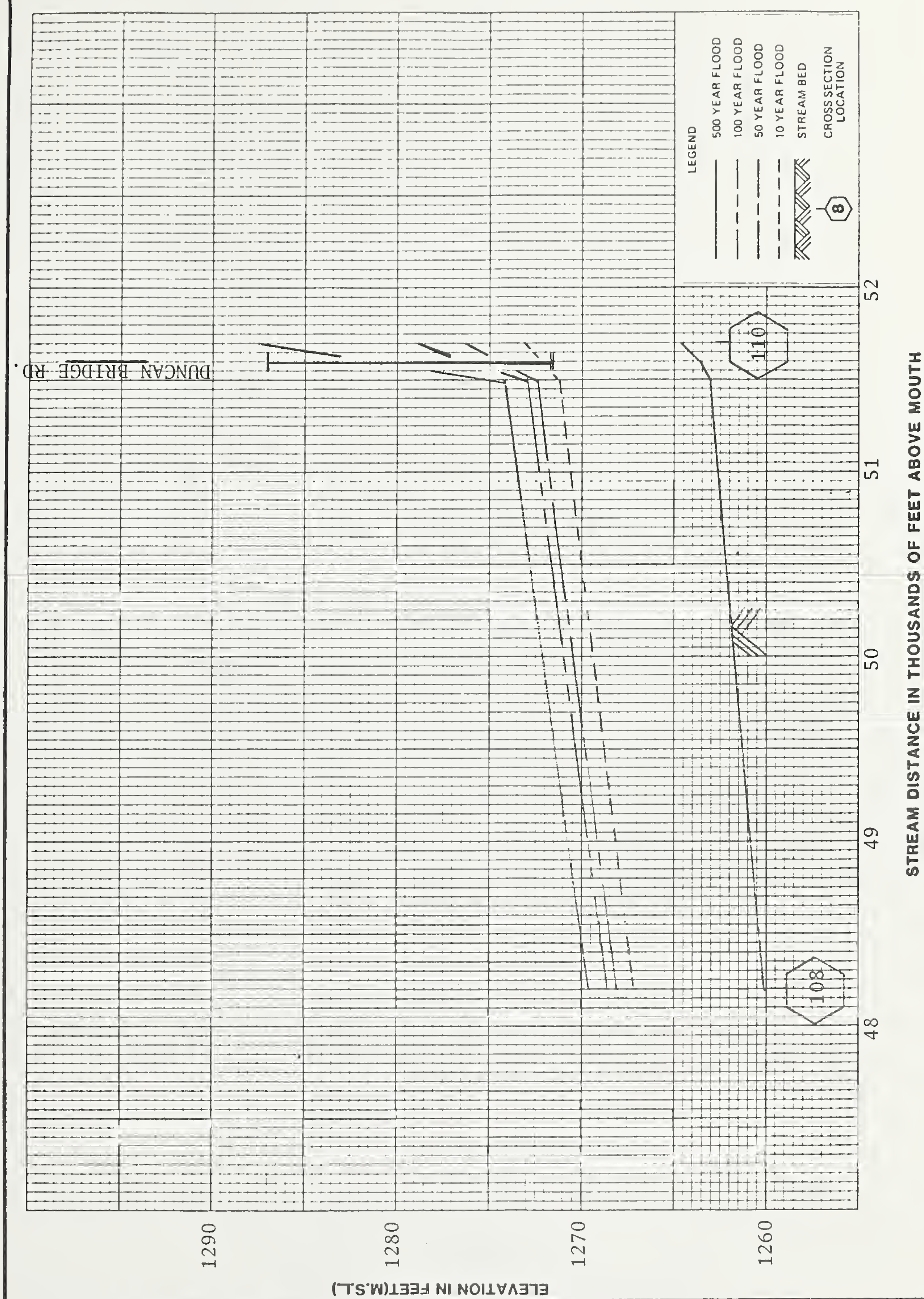
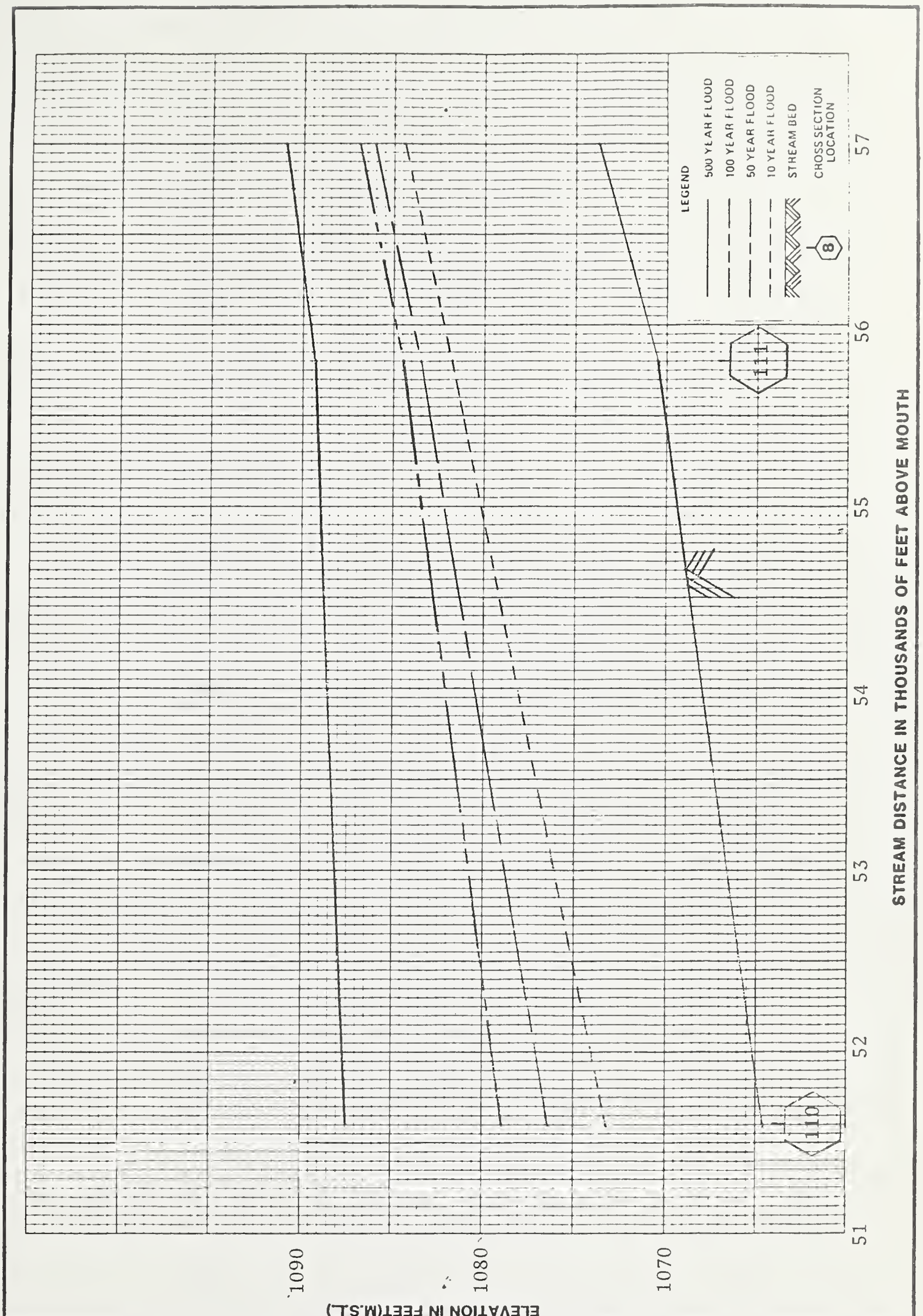
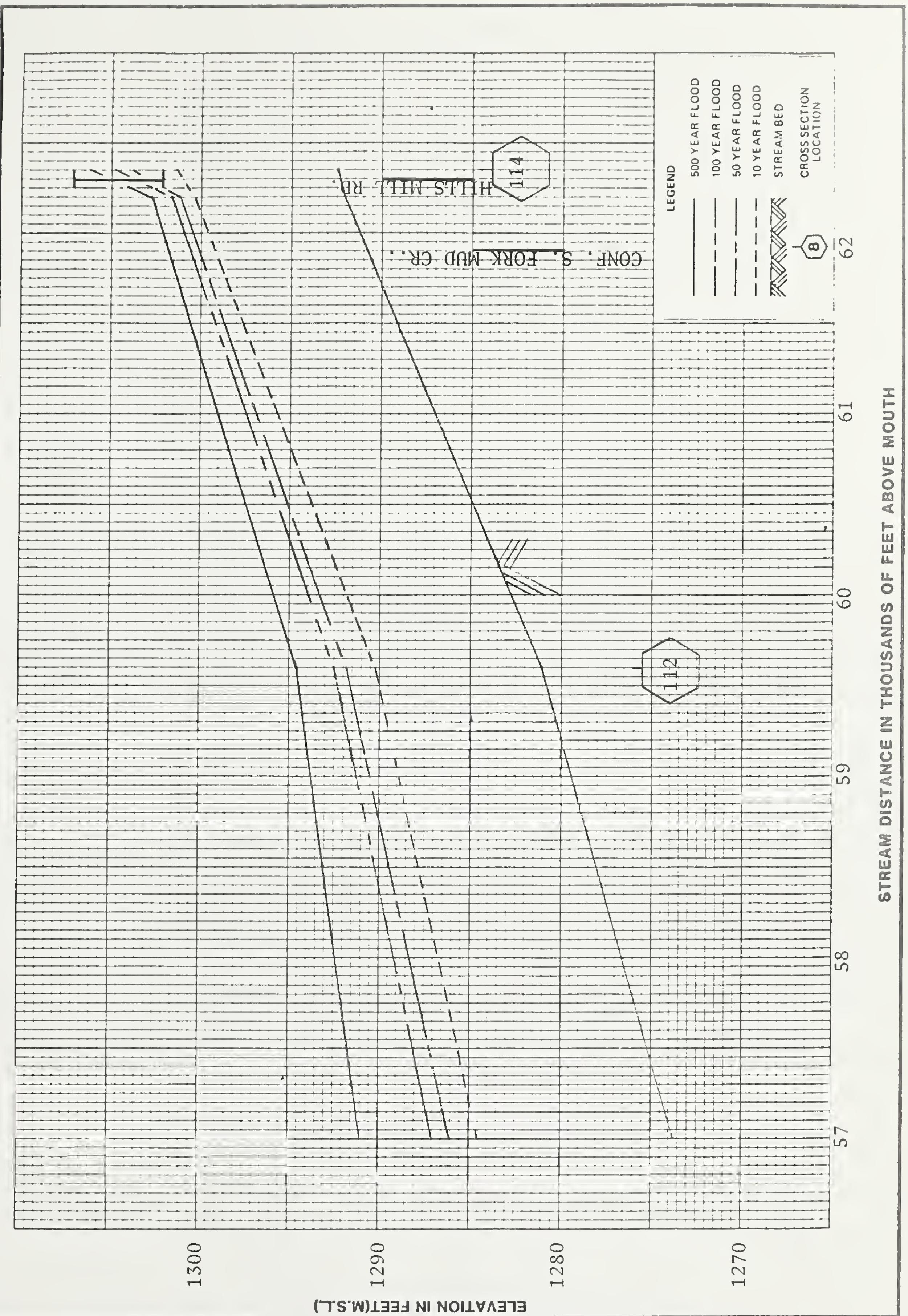
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
MUD CREEK
ELEVATION IN FEET(M.S.L.)
1270
1260
1250
1240
DIRT RD
107
107A
108
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION
42
43
44
45
46
47
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH



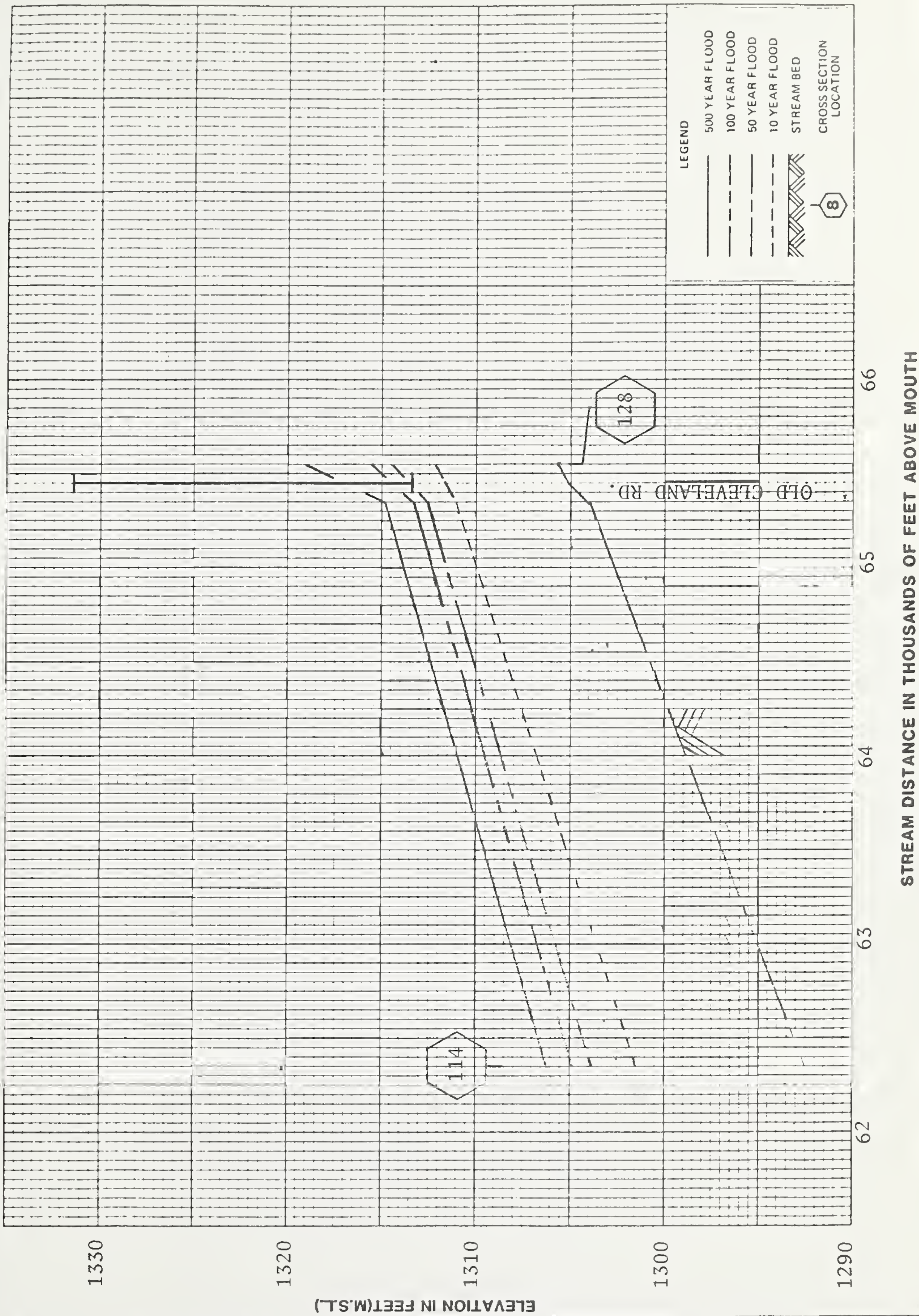
5	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



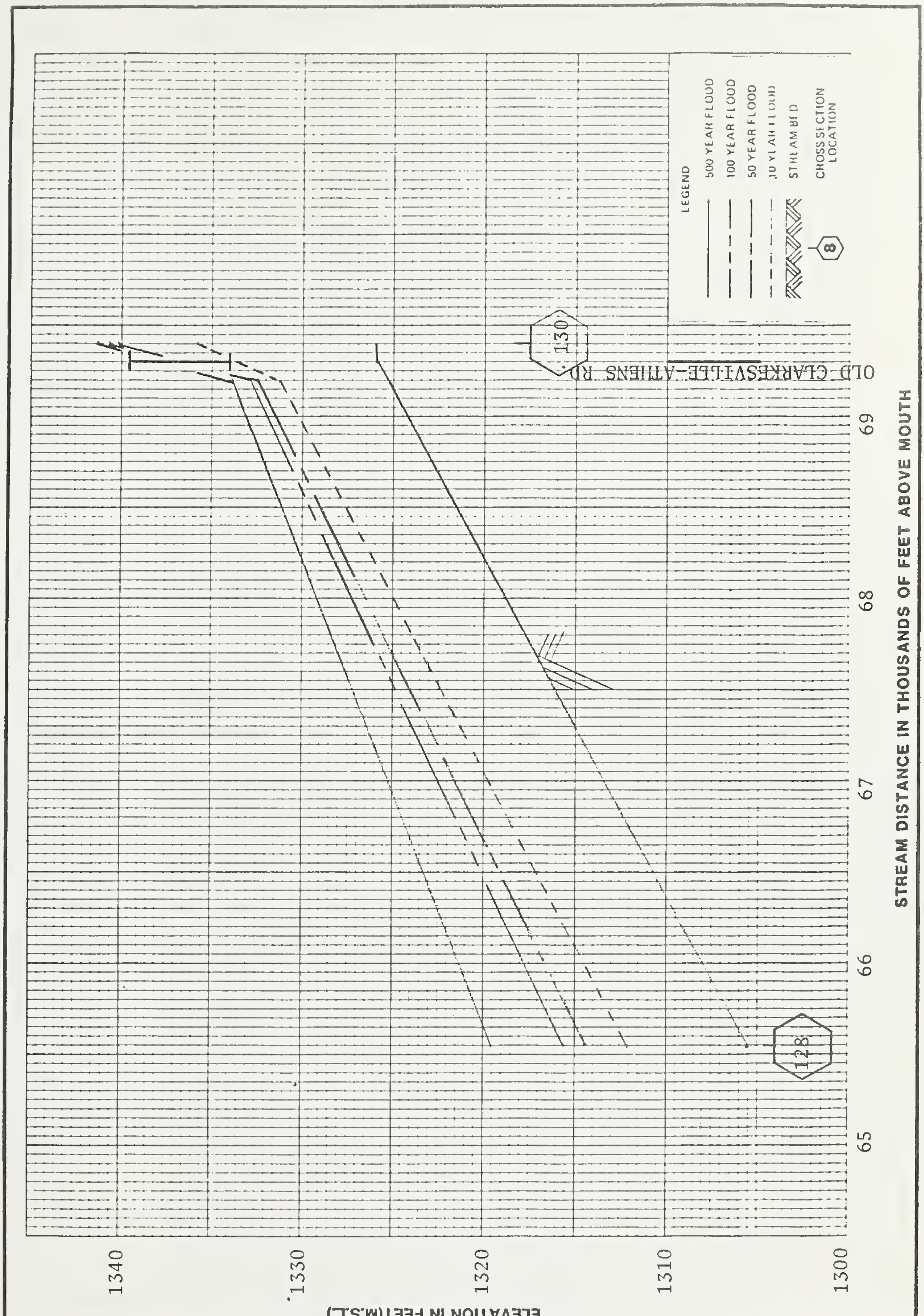
6	U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



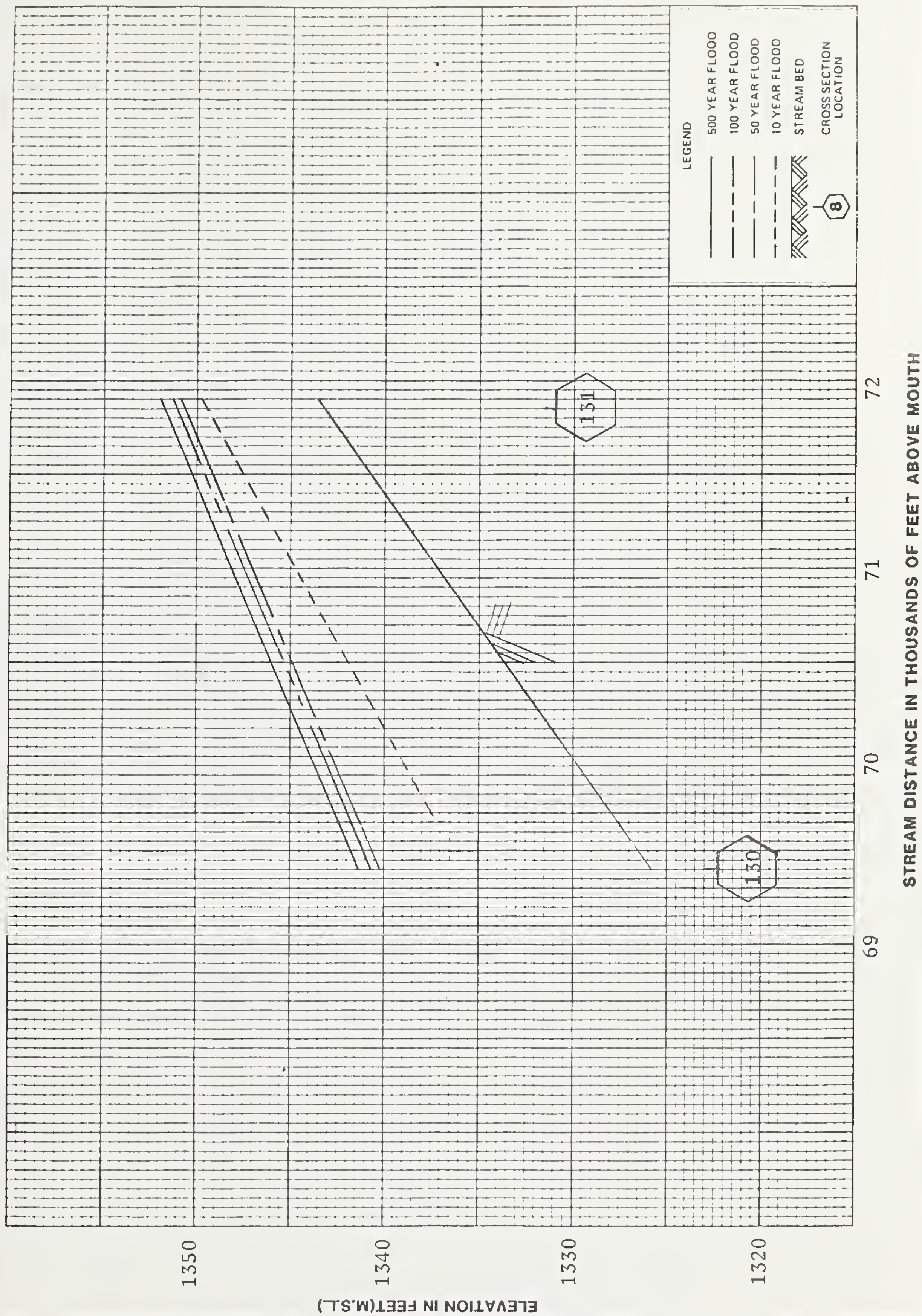
7	U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE FLOOD PLAIN MANAGEMENT STUDY HABERSHAM COUNTY, GEORGIA	FLOOD PROFILES MUD CREEK



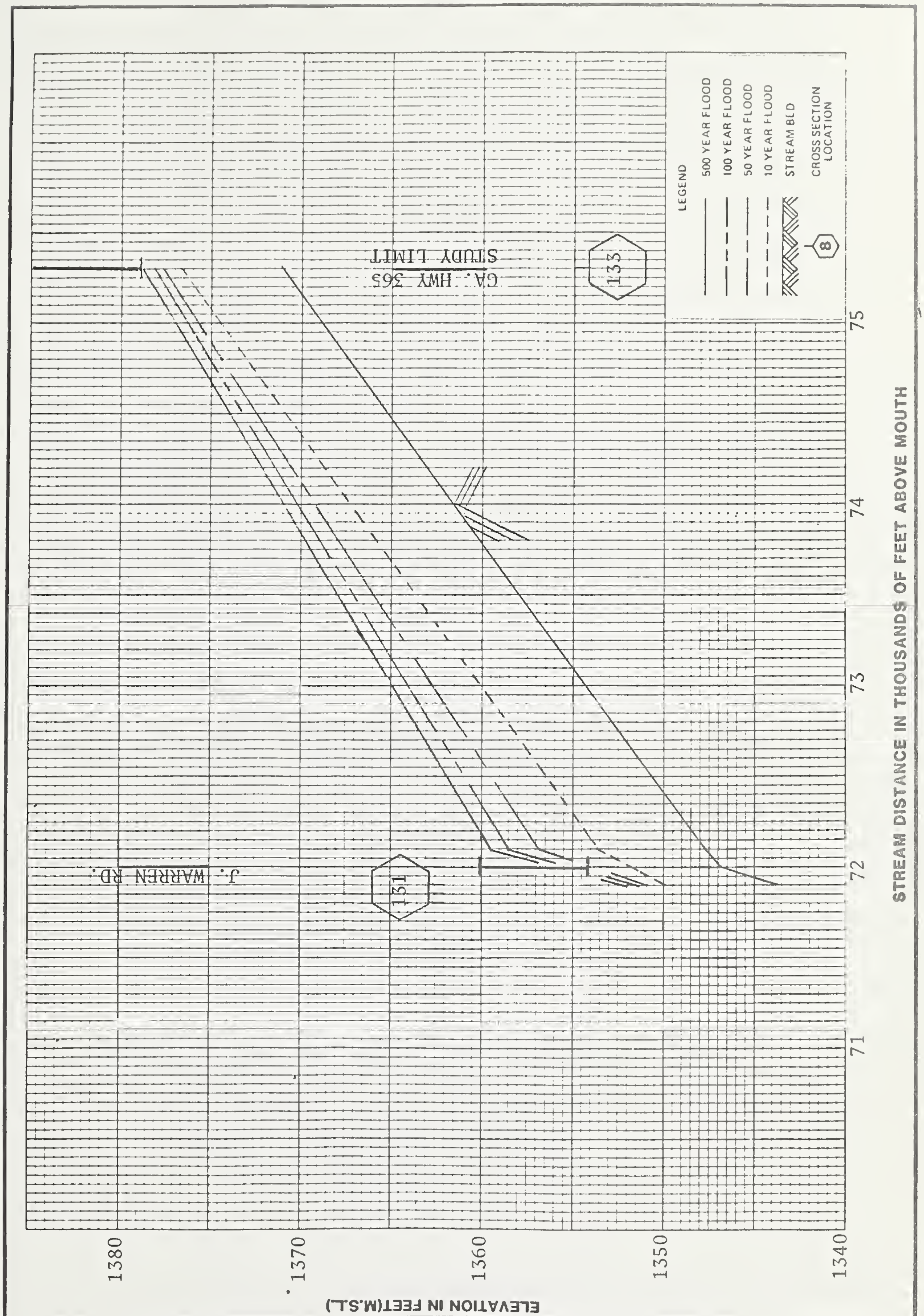
8	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



9	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



10	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** MUD CREEK



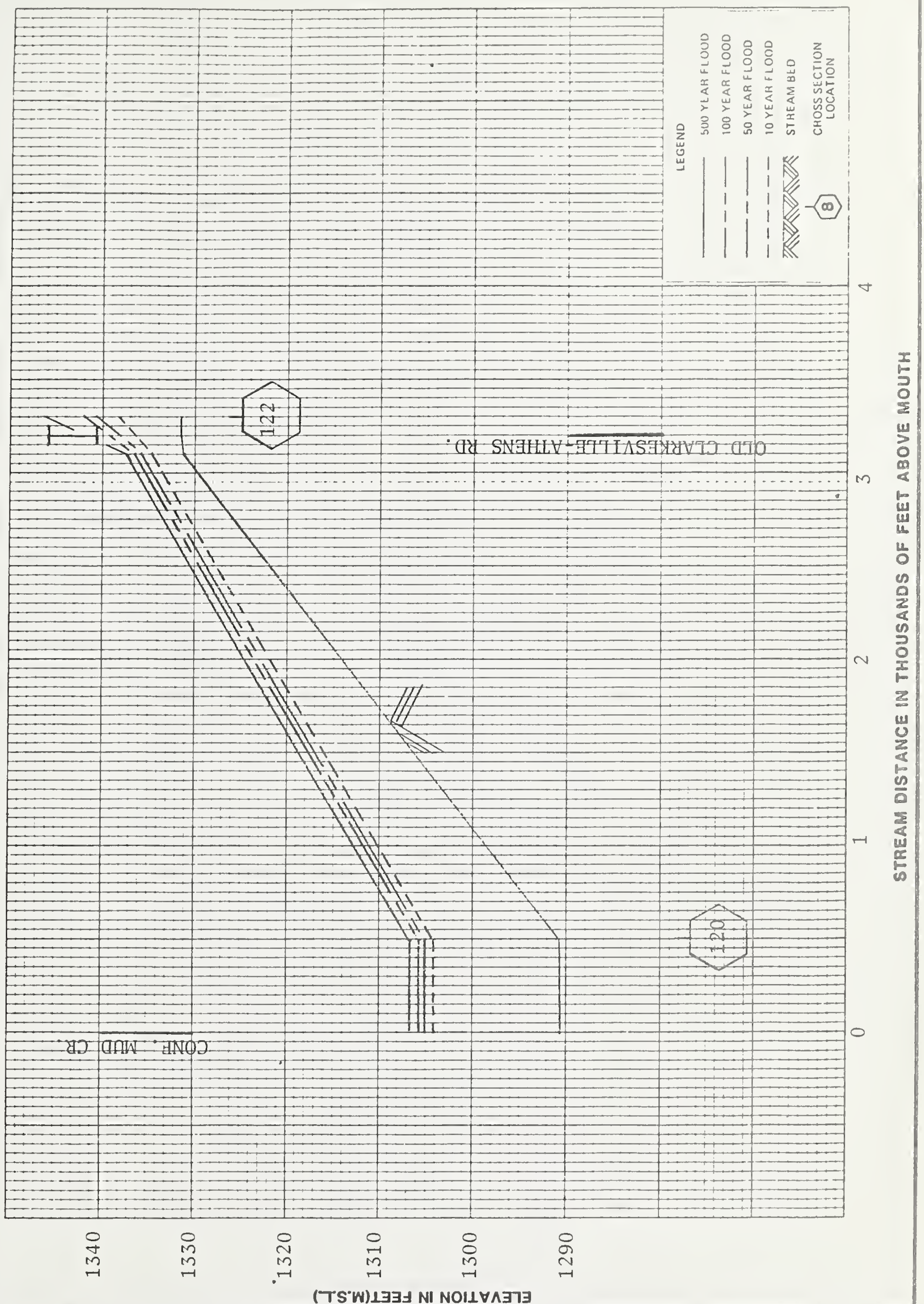
11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

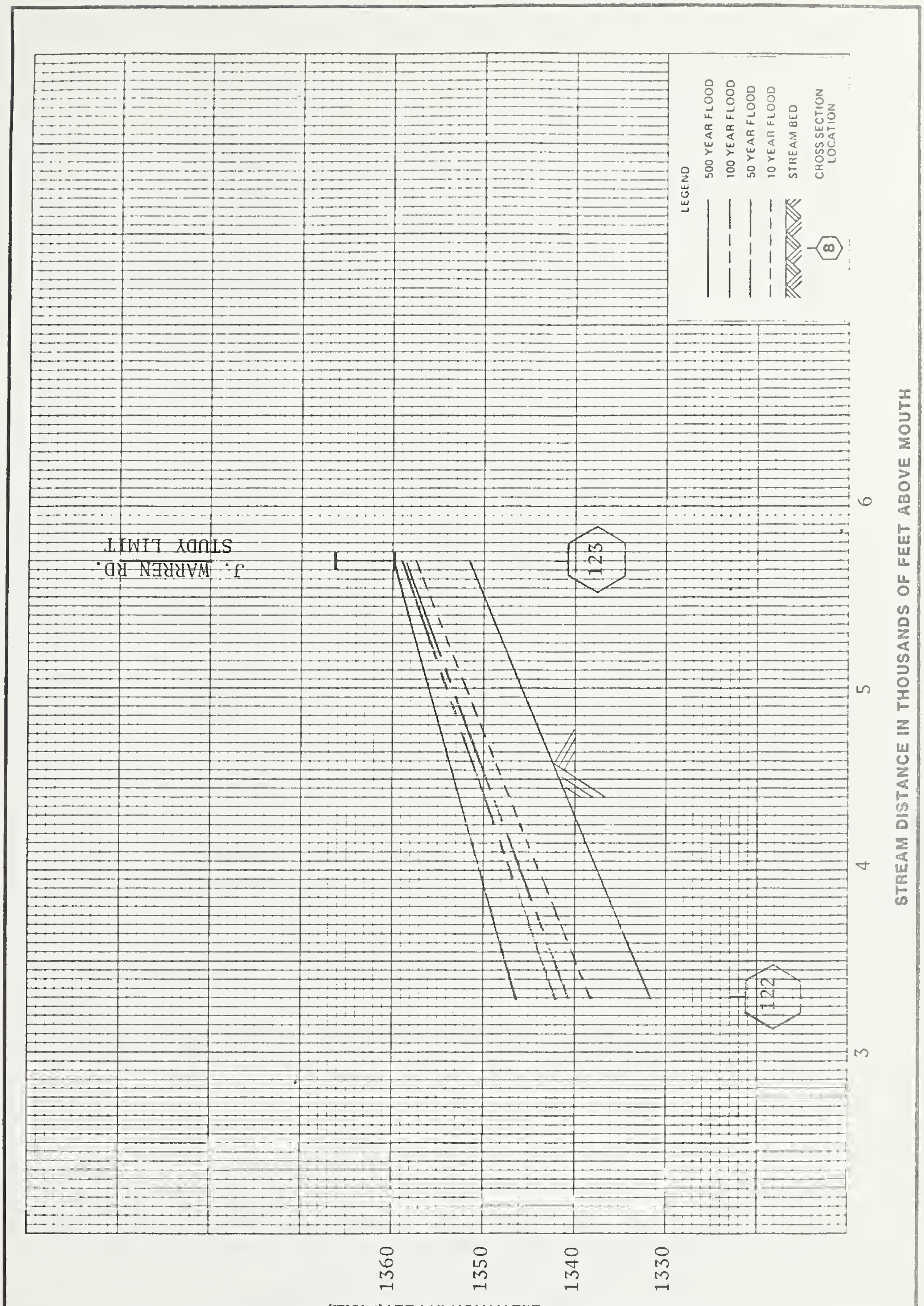
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

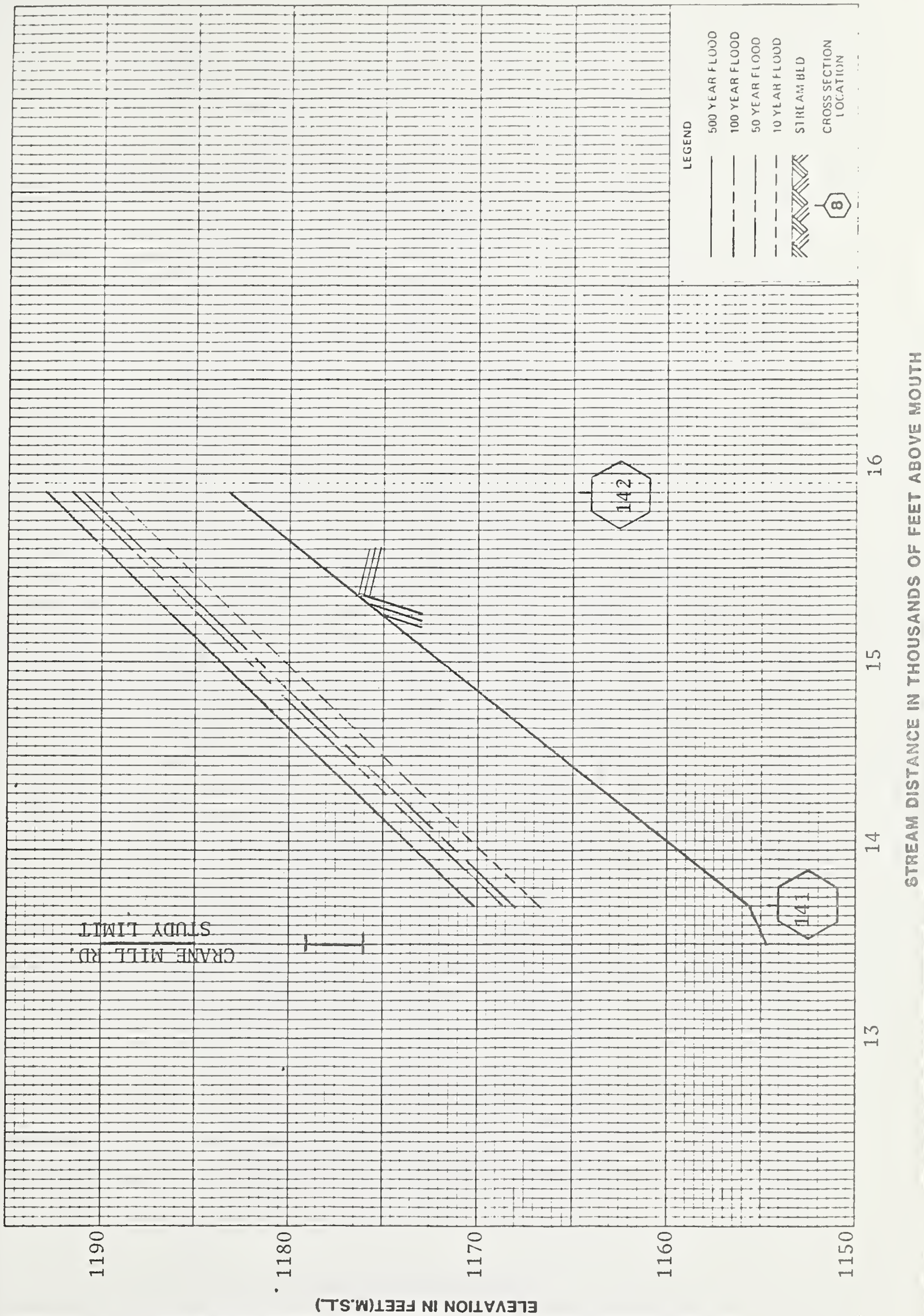
MUD CREEK



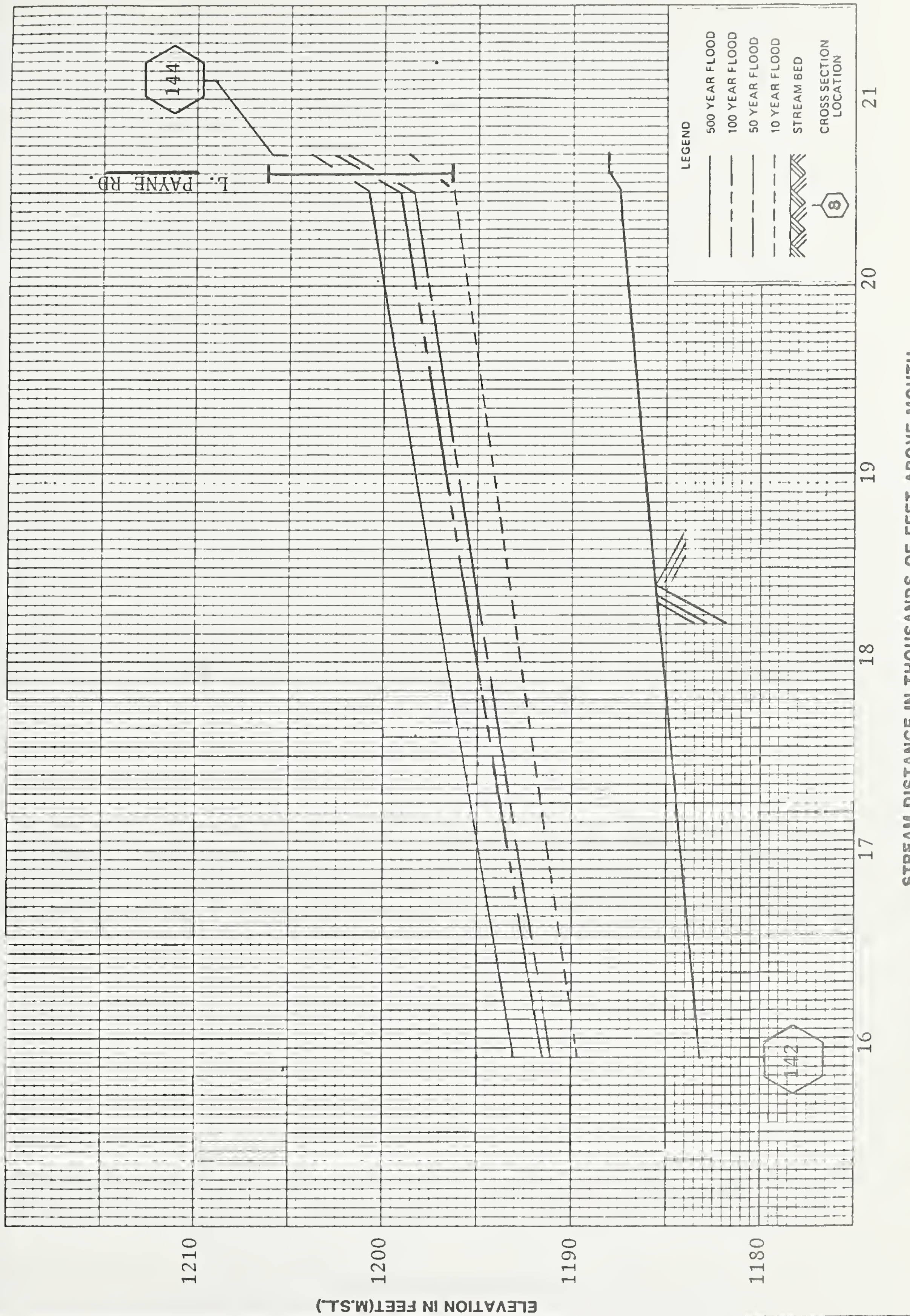
12	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** SOUTH FORK MUD CREEK



13	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** SOUTH FORK MUD CREEK



14	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** LITTLE MUD CREEK

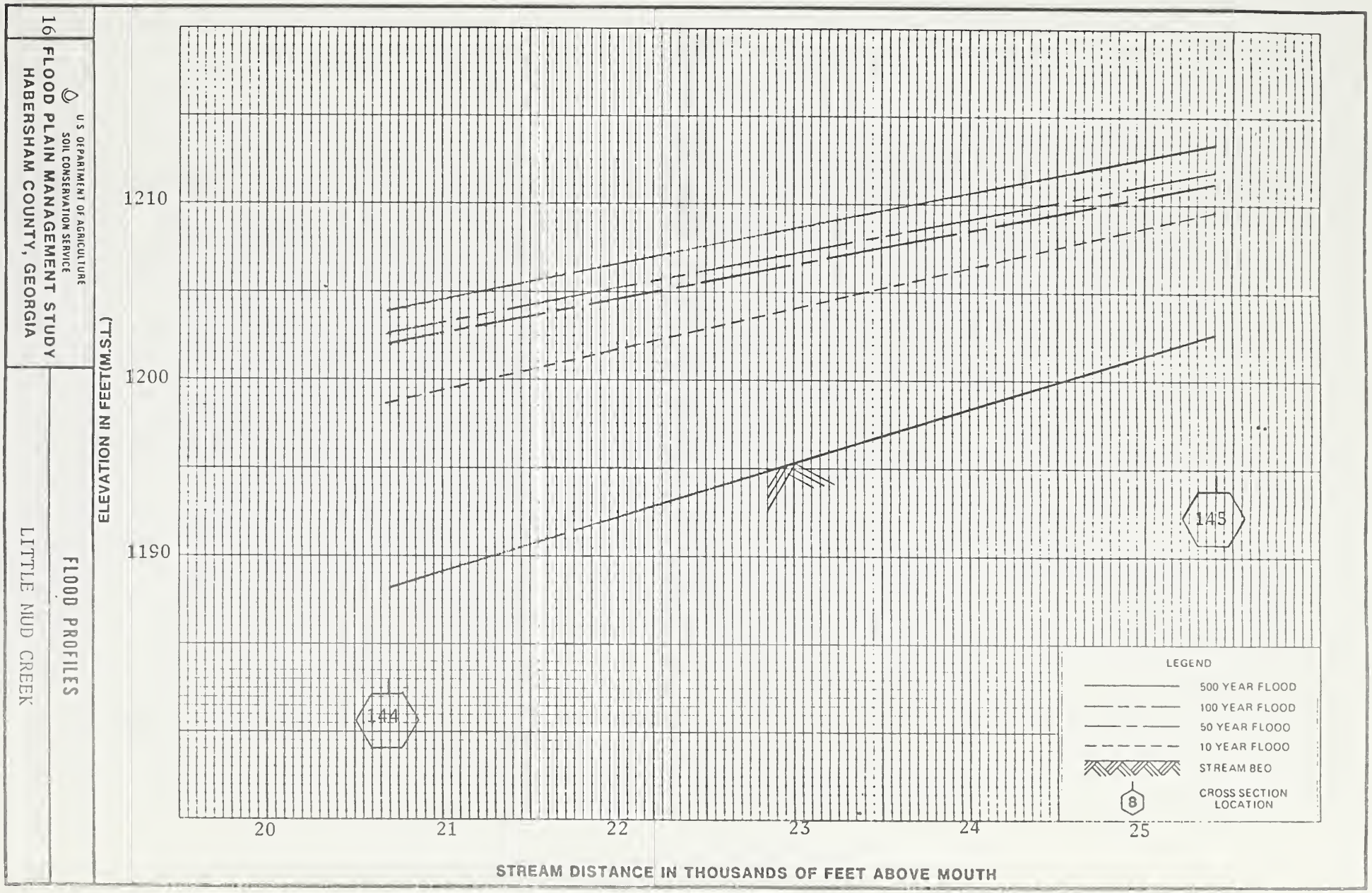


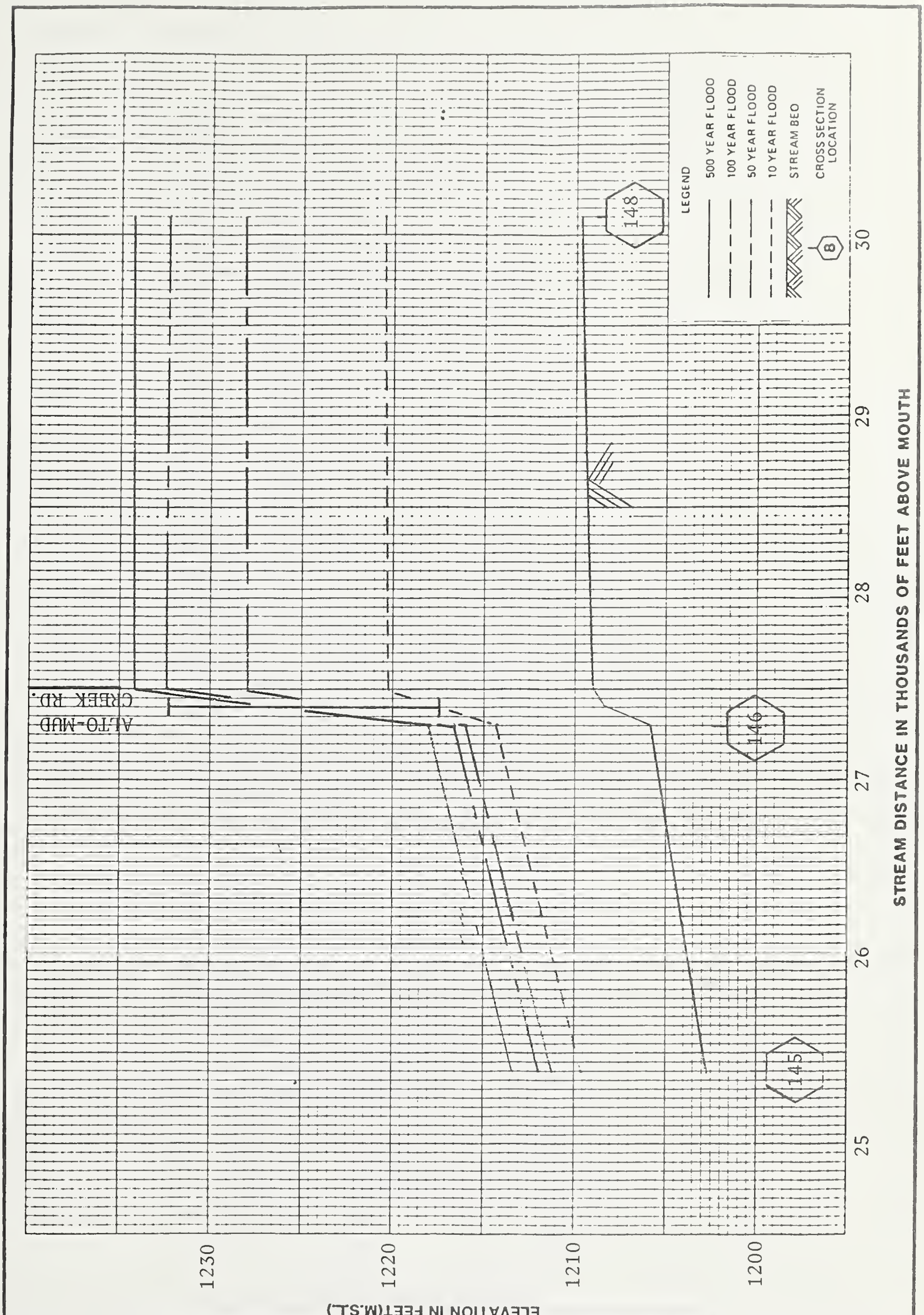
15

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LITTLE MUD CREEK


16
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
LITTLE MUD CREEK
ELEVATION IN FEET(M.S.L.)
1210
1200
1190
144
145
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION
20
21
22
23
24
25
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH



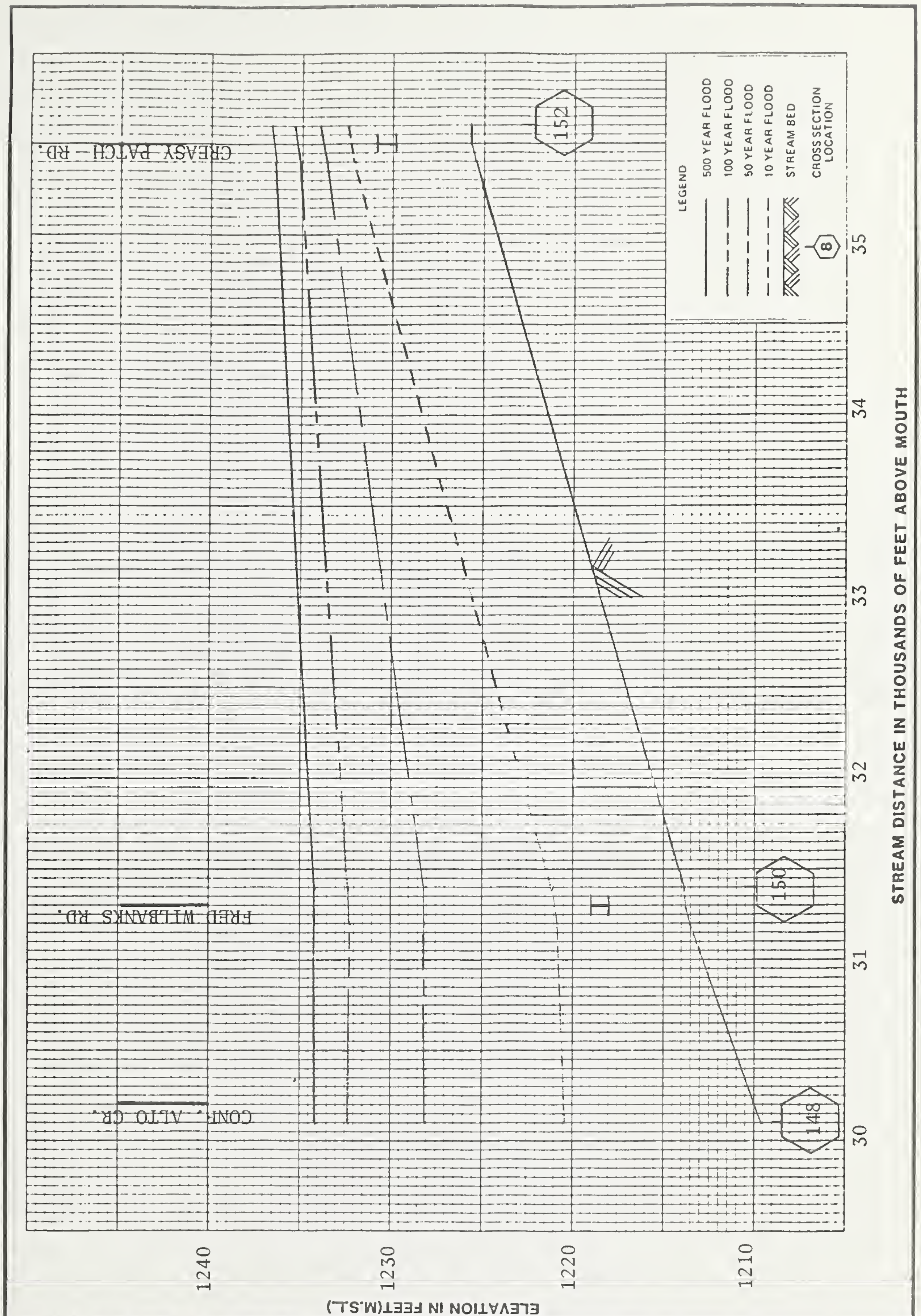
17

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LITTLE MUD CREEK

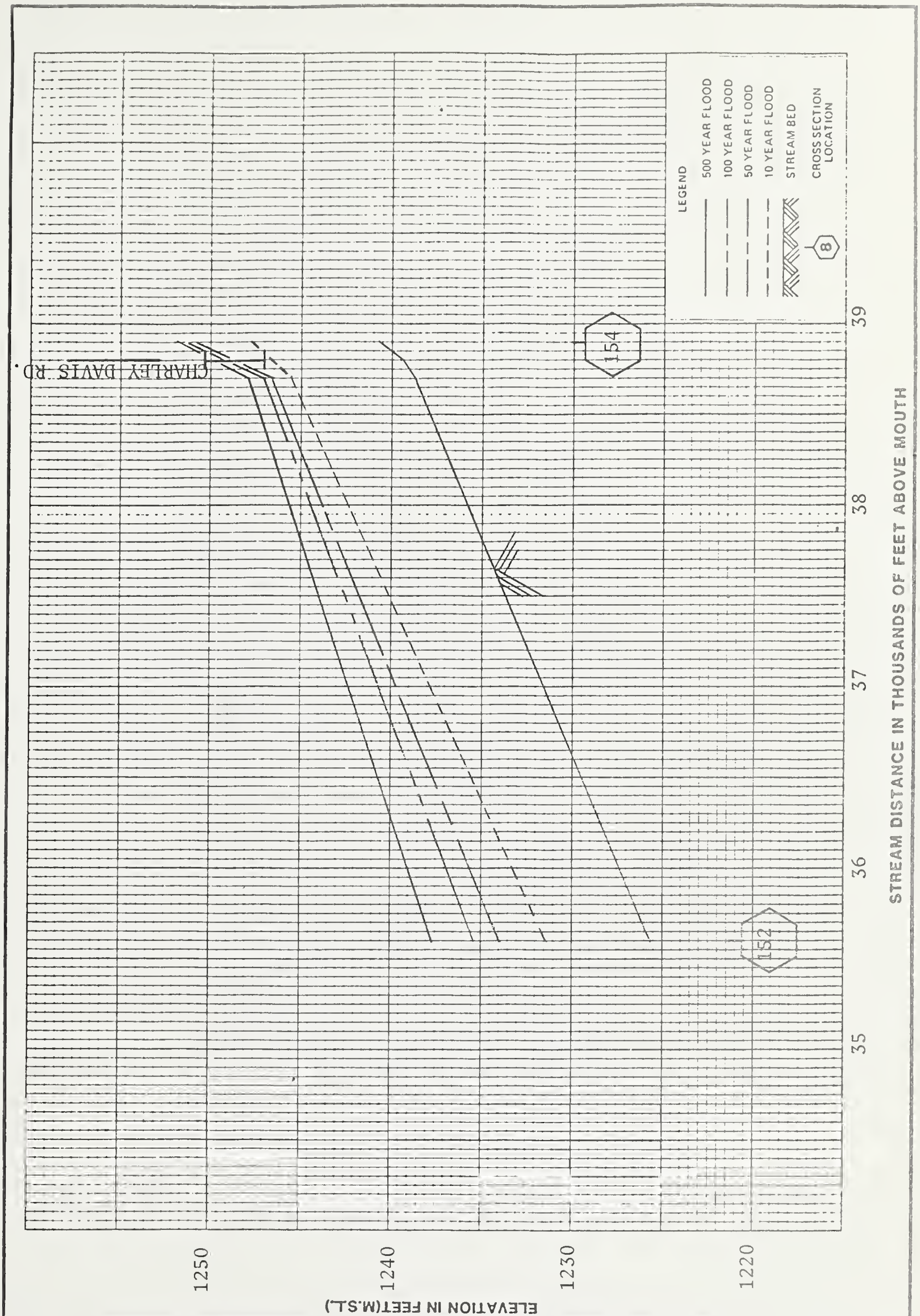


U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

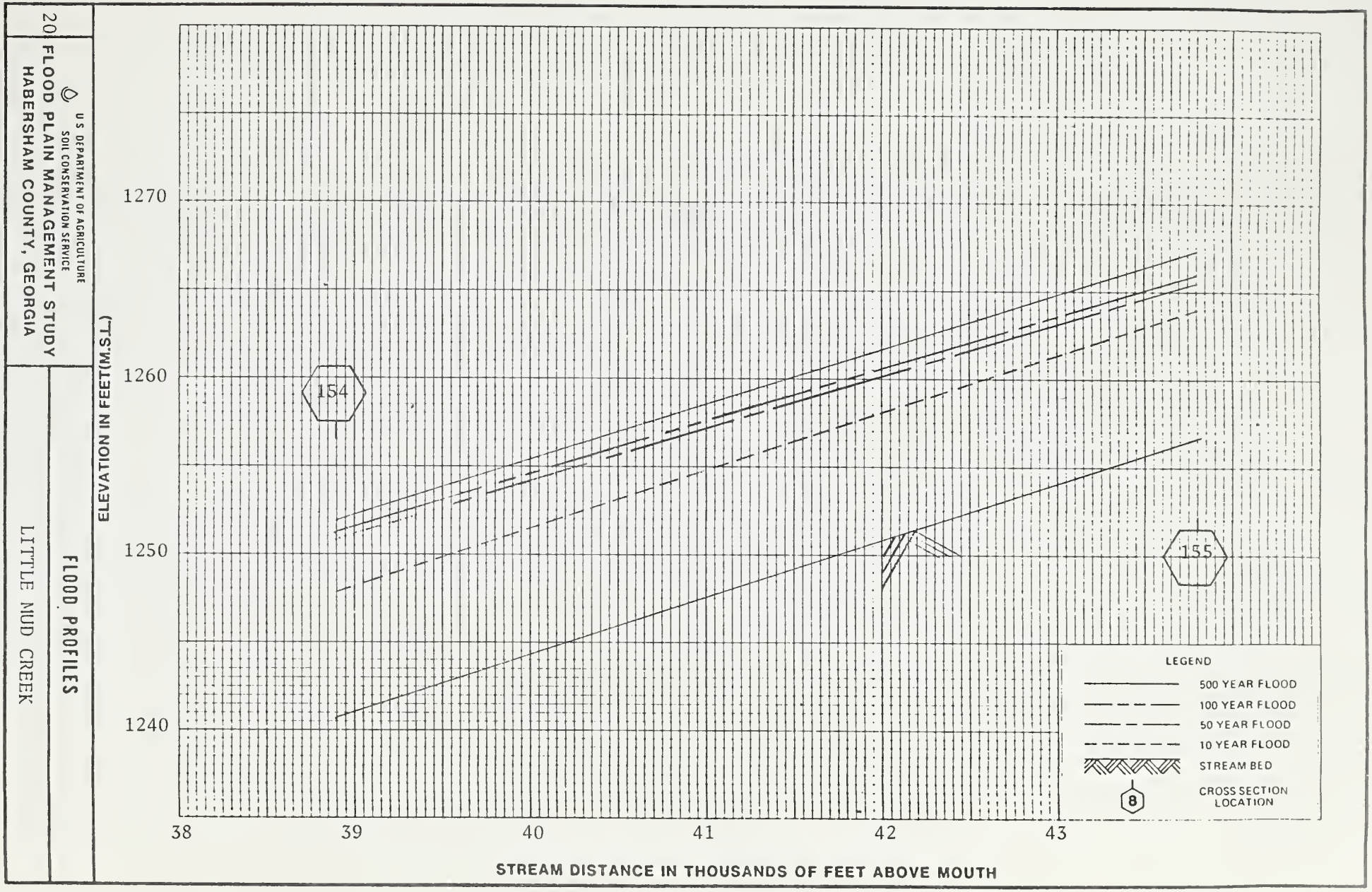
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

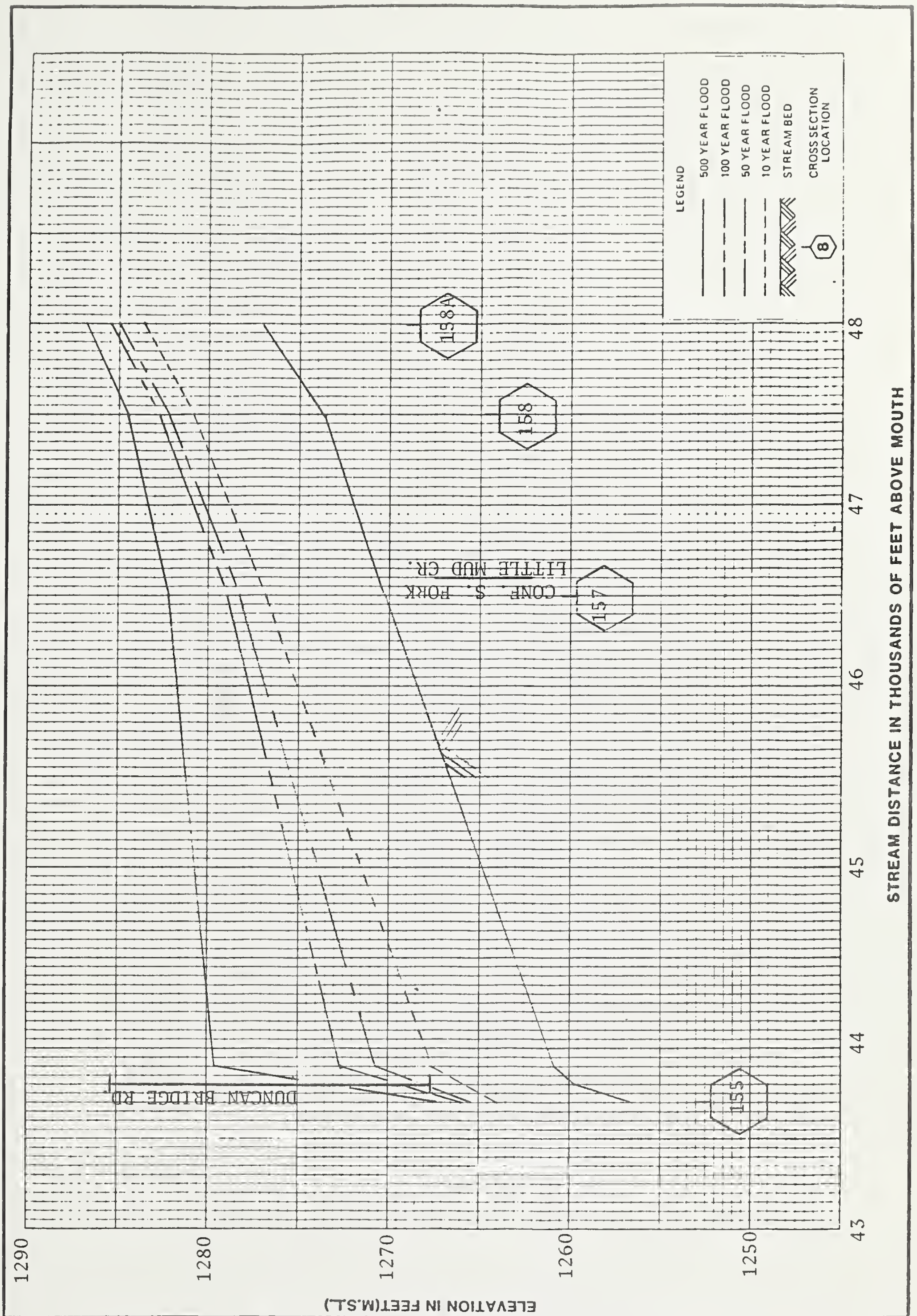
FLOOD PROFILES

LITTLE MUD CREEK



19	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	FLOOD PROFILES LITTLE MUD CREEK


20
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
LITTLE MUD CREEK
ELEVATION IN FEET(M.S.L.)
1270
1260
1250
1240
154
155
38
39
40
41
42
43
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION

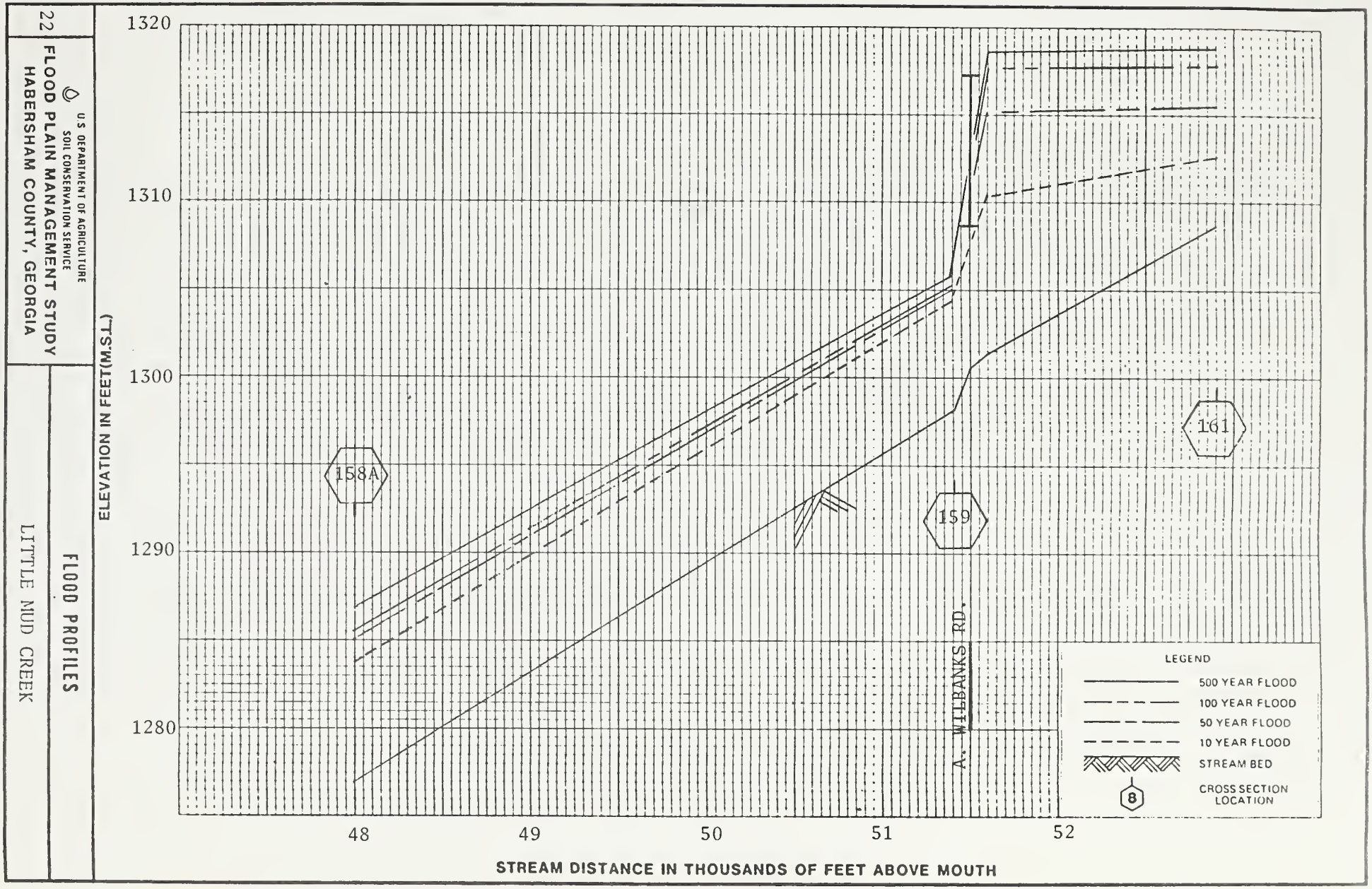


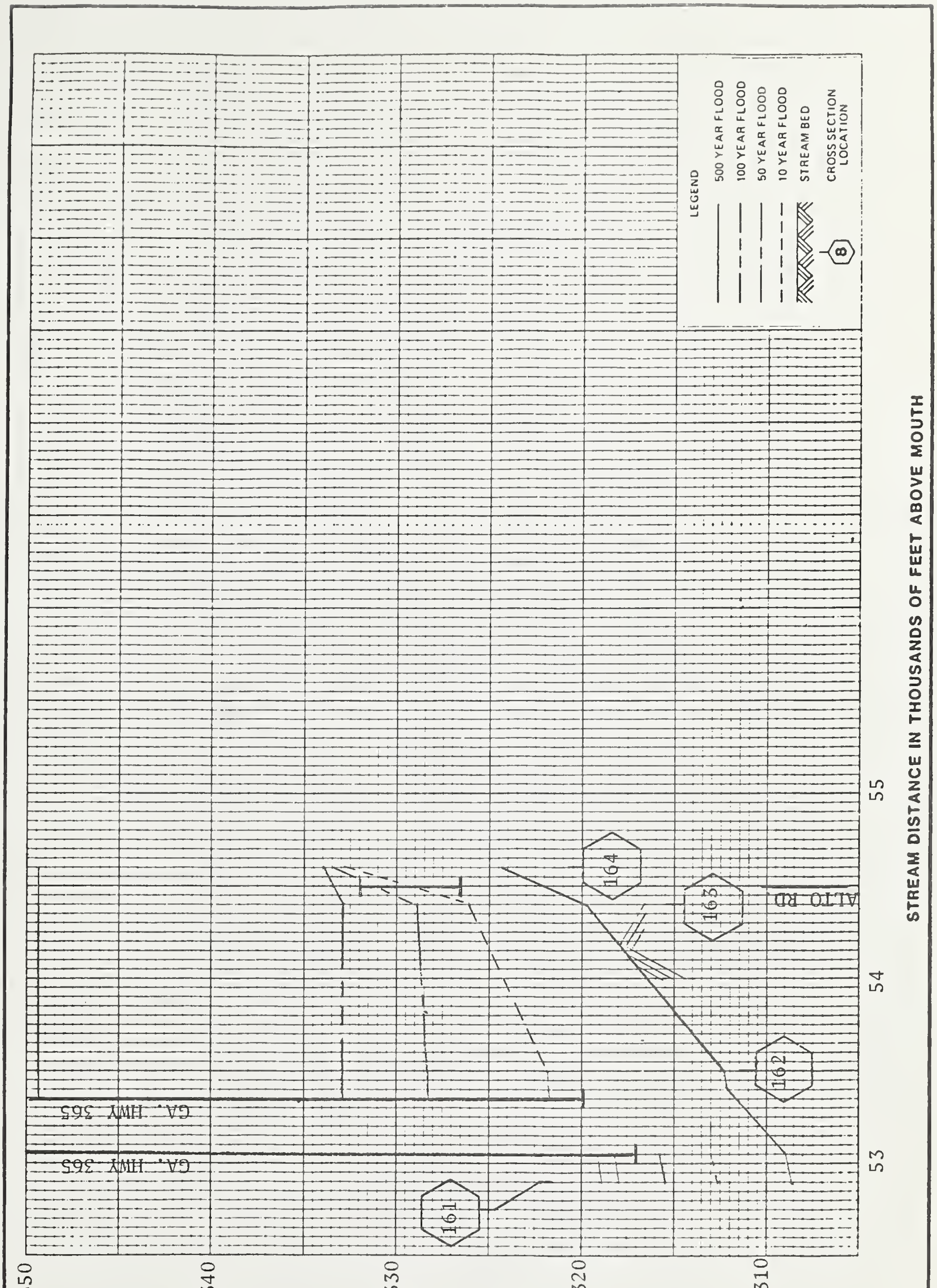
21

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

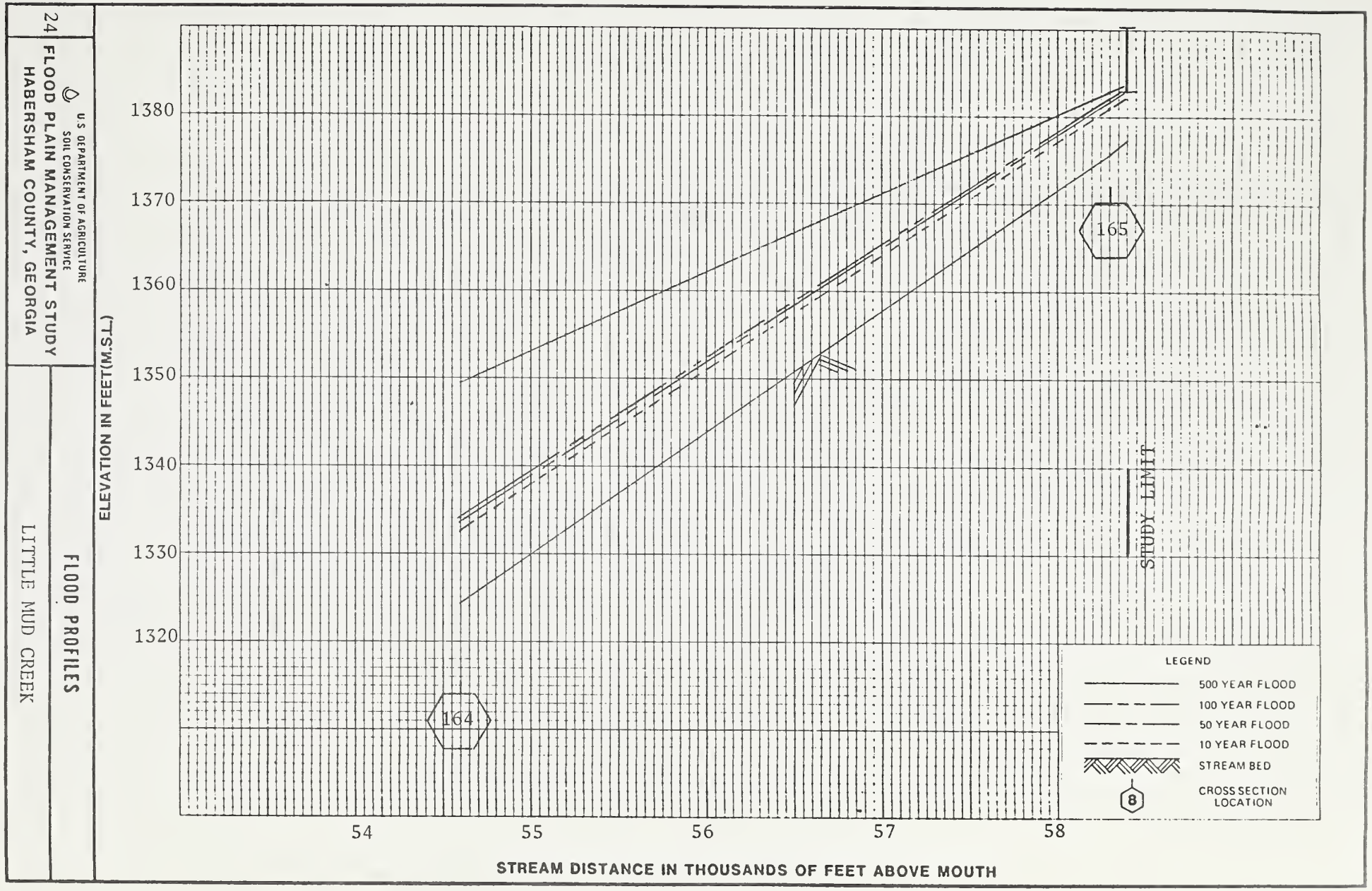
FLOOD PROFILES

LITTLE MUD CREEK


22
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
LITTLE MUD CREEK
ELEVATION IN FEET(M.S.L.)
1320
1310
1300
1290
1280
48
49
50
51
52
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH
158A
159
161
A. WILBANKS RD.
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION



23	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** LITTLE MUD CREEK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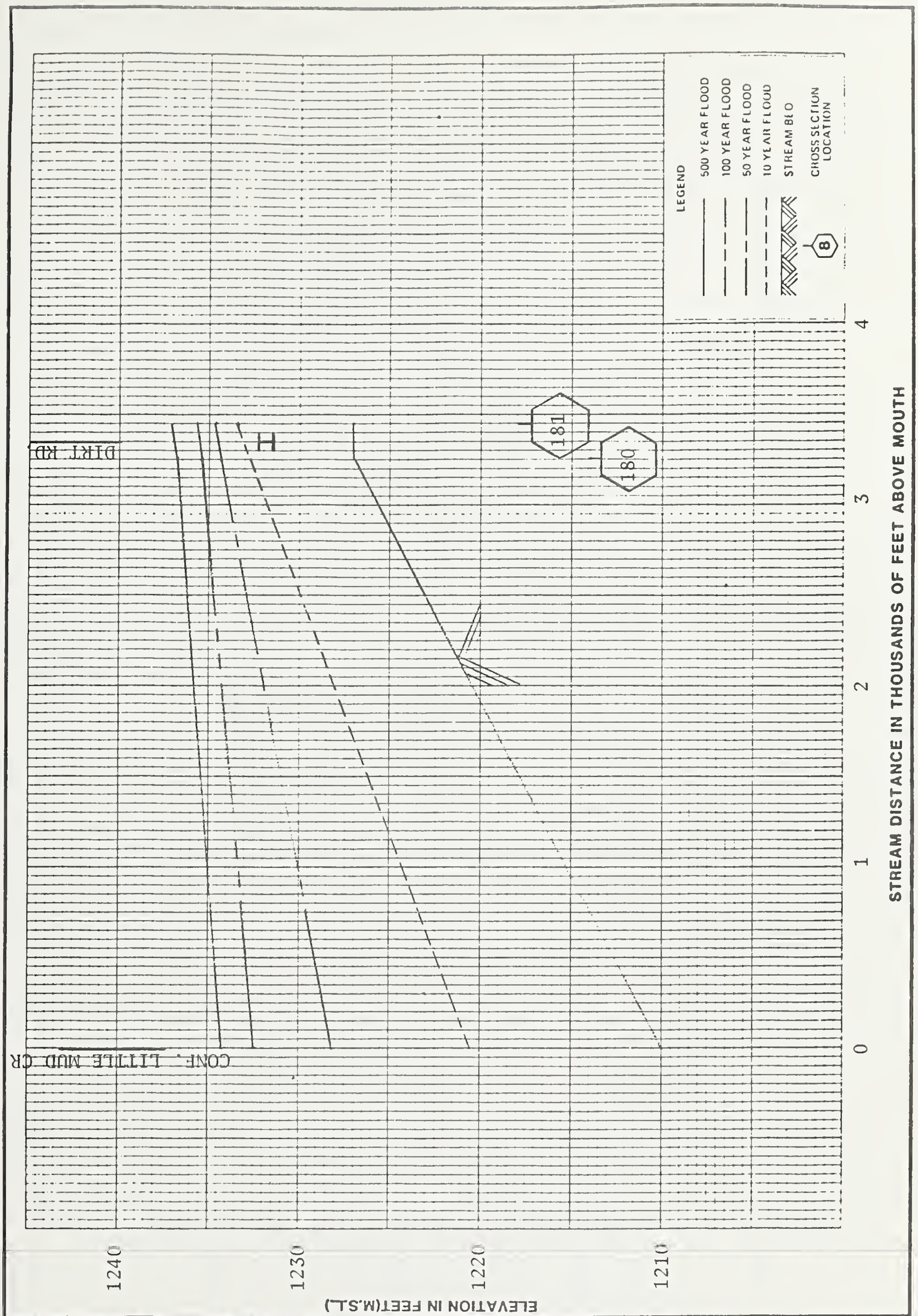
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
LITTLE MUD CREEK
ELEVATION IN FEET(M.S.L.)
1380
1370
1360
1350
1340
1330
1320
54
55
56
57
58
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH
164
165
STUDY LIMIT
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION



25

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

ALTO CREEK

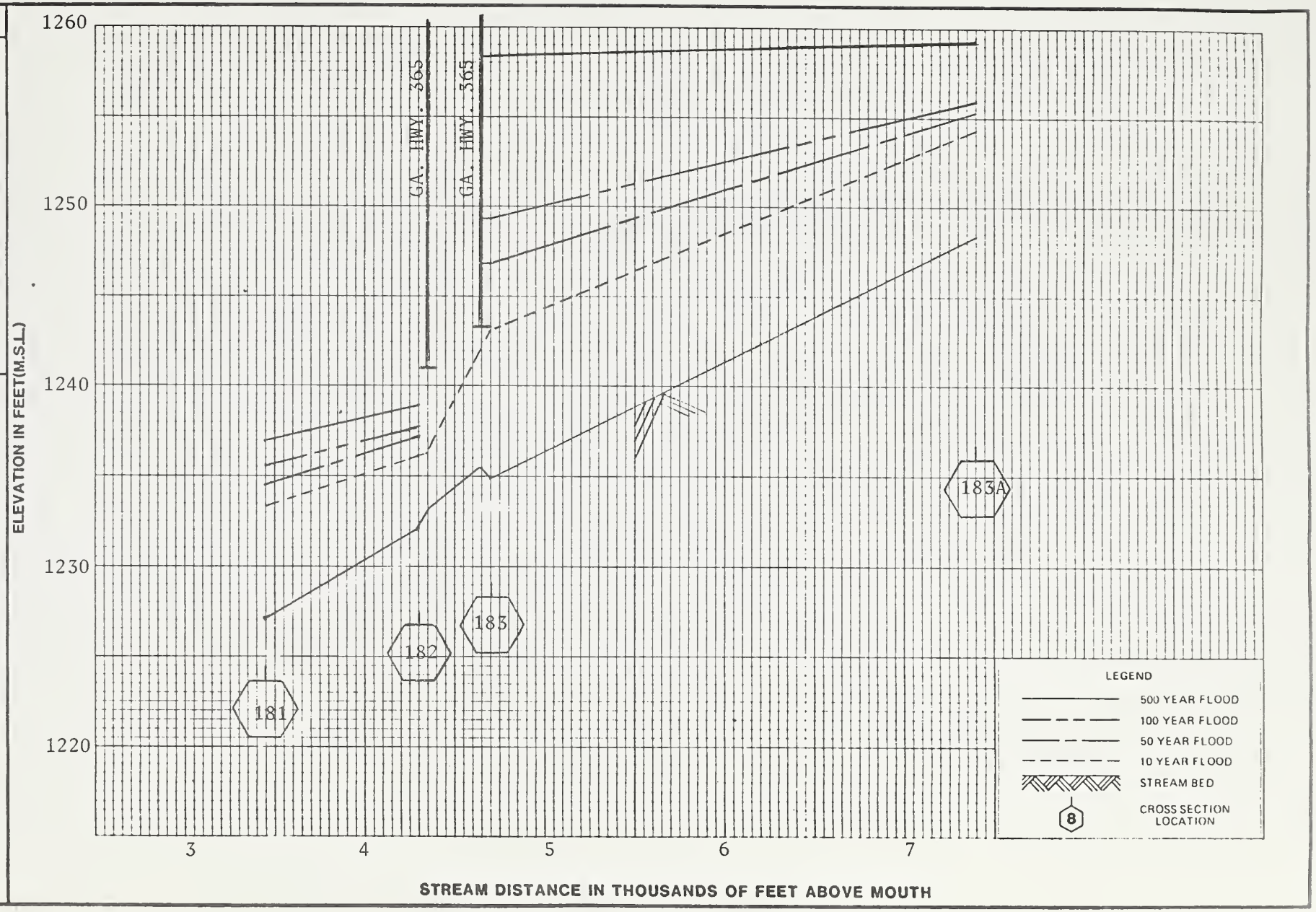
26

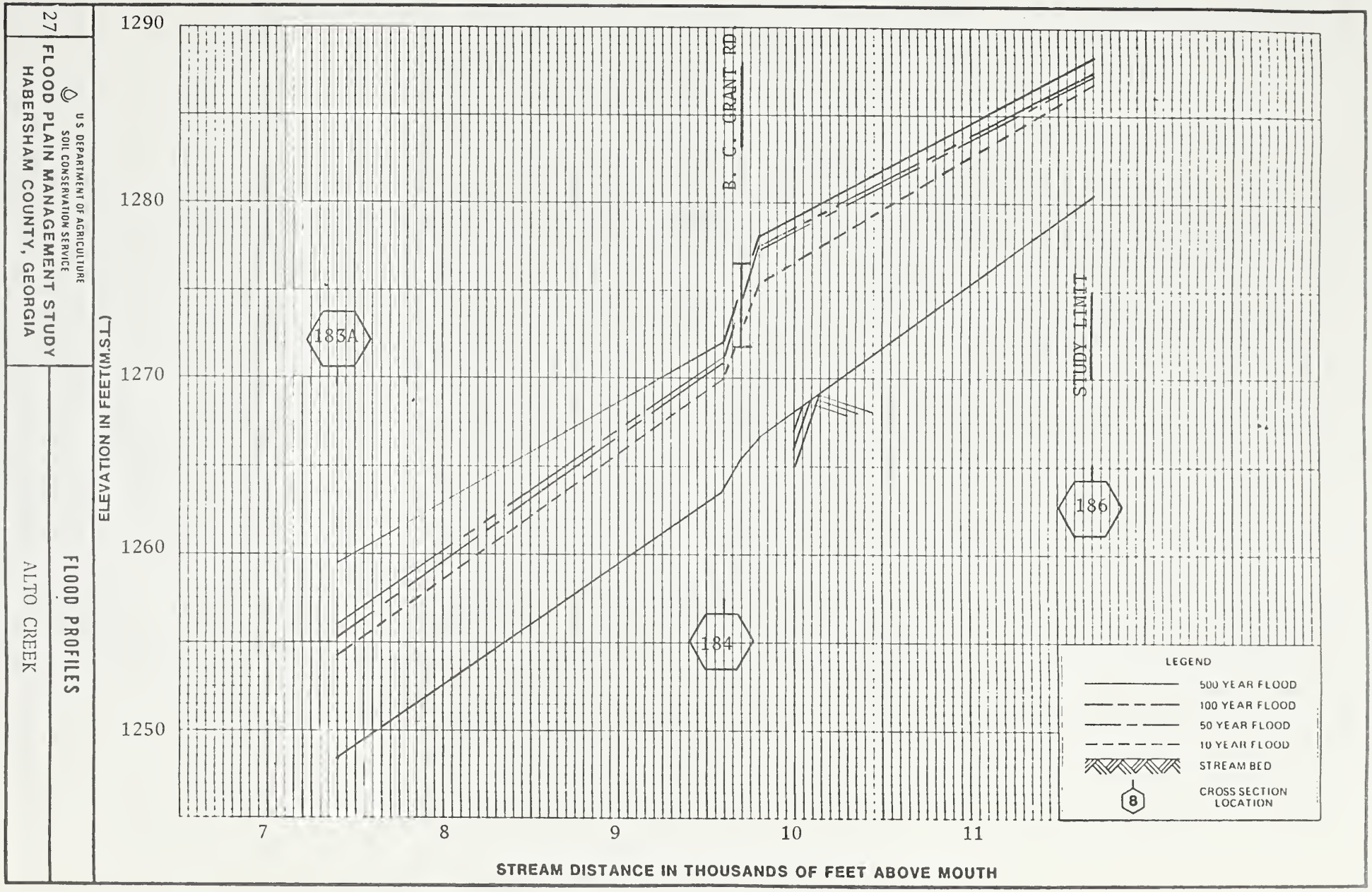
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

ALTO CREEK

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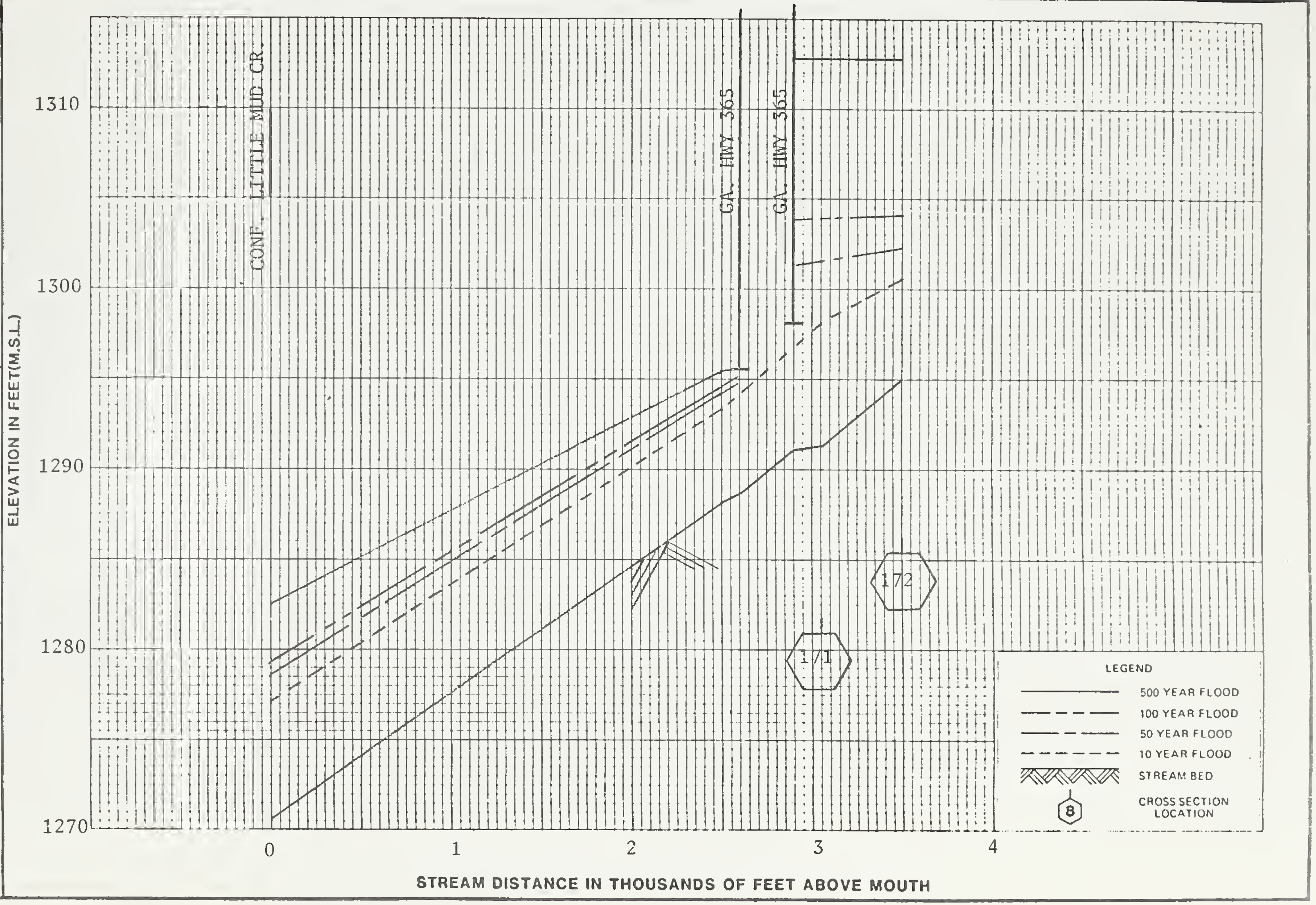
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA
FLOOD PROFILES
ALTO CREEK
ELEVATION IN FEET(M.S.L.)
1290
1280
1270
1260
1250
7
8
9
10
11
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH
B. C. GRANT RD
STUDY LIMIT
183A
184
186
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
8
CROSS SECTION LOCATION



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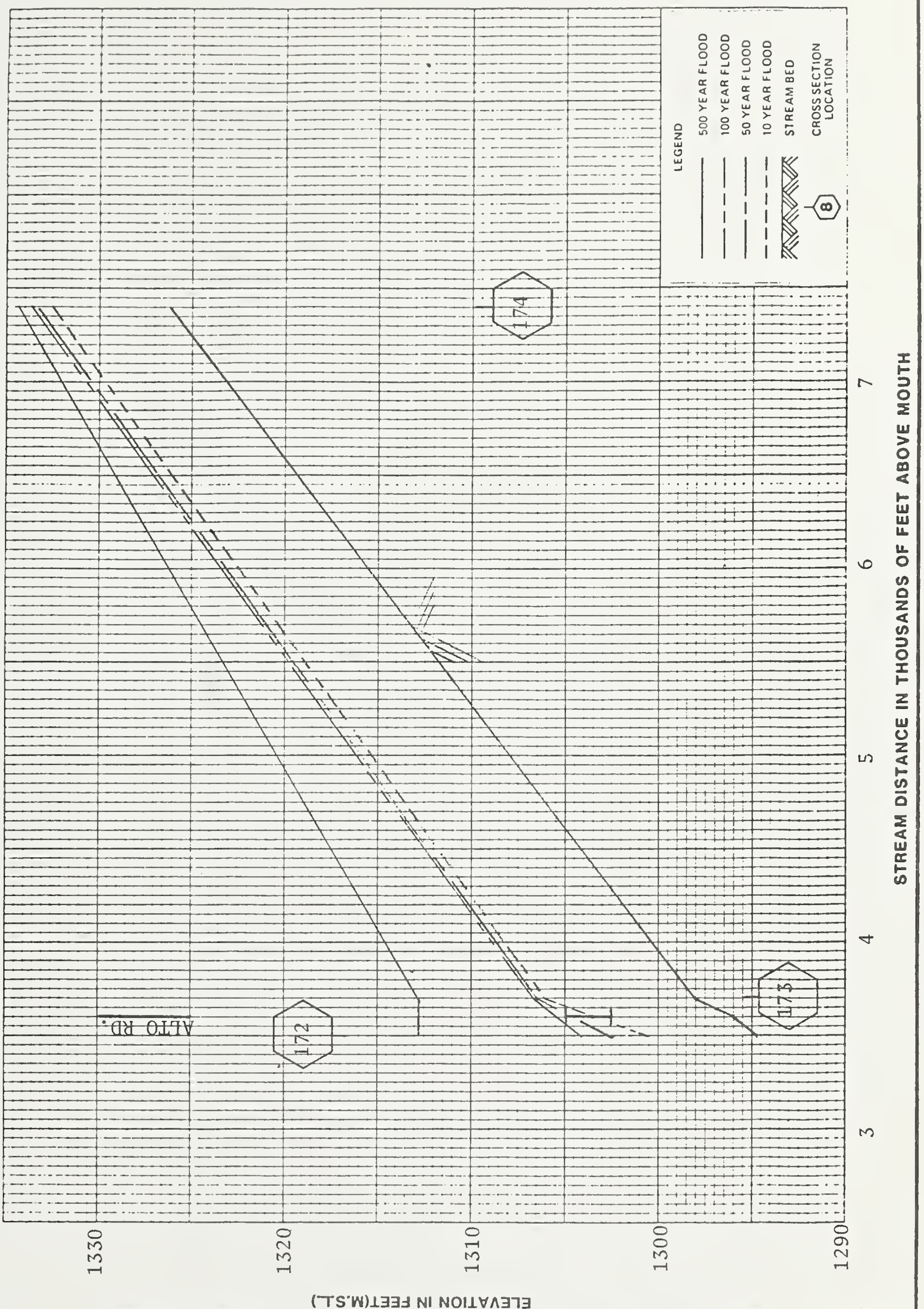
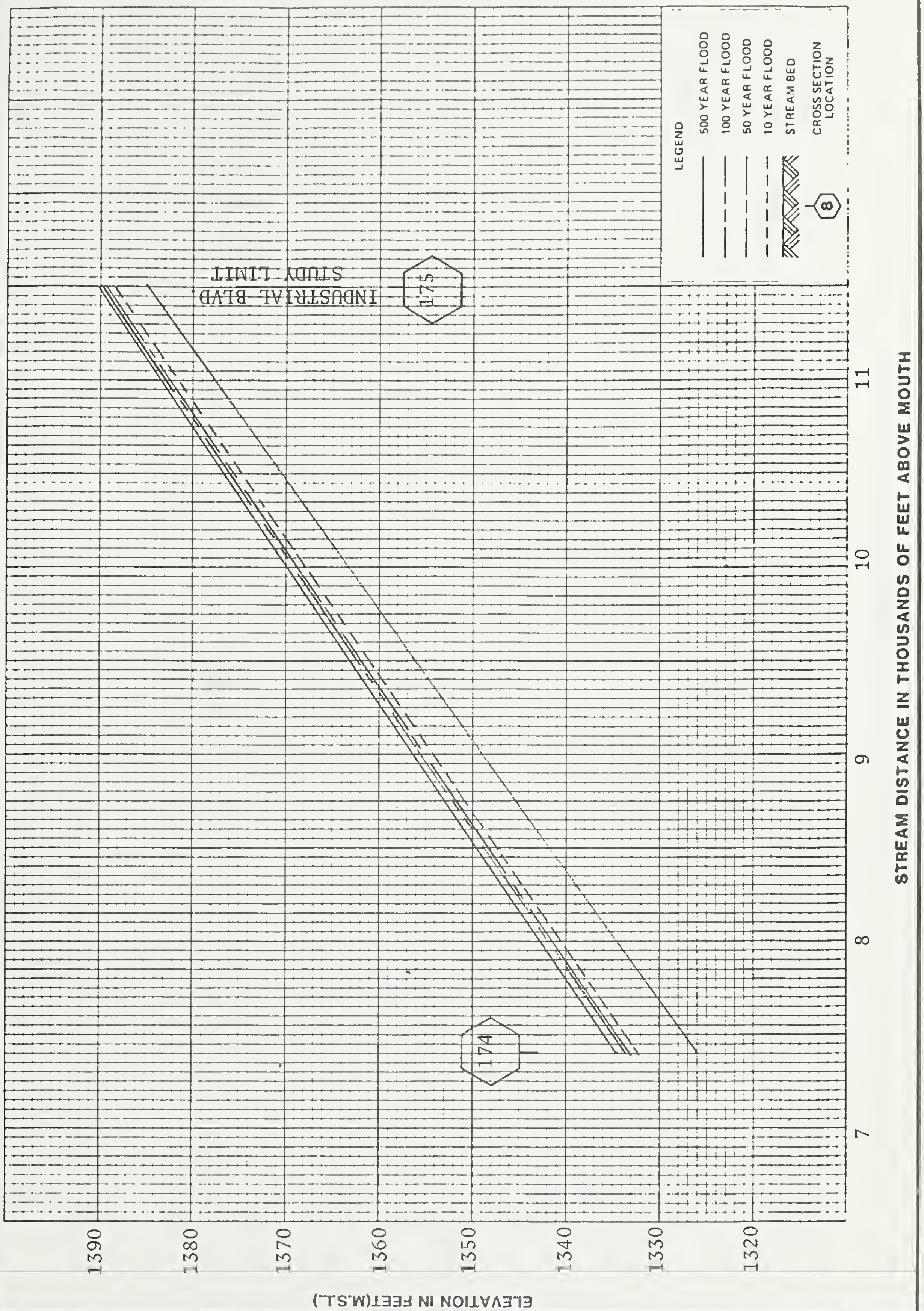
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

SOUTH FORK LITTLE MUD CREEK



29	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE FLOOD PLAIN MANAGEMENT STUDY HABERSHAM COUNTY, GEORGIA	FLOOD PROFILES SOUTH FORK LITTLE MUD CREEK



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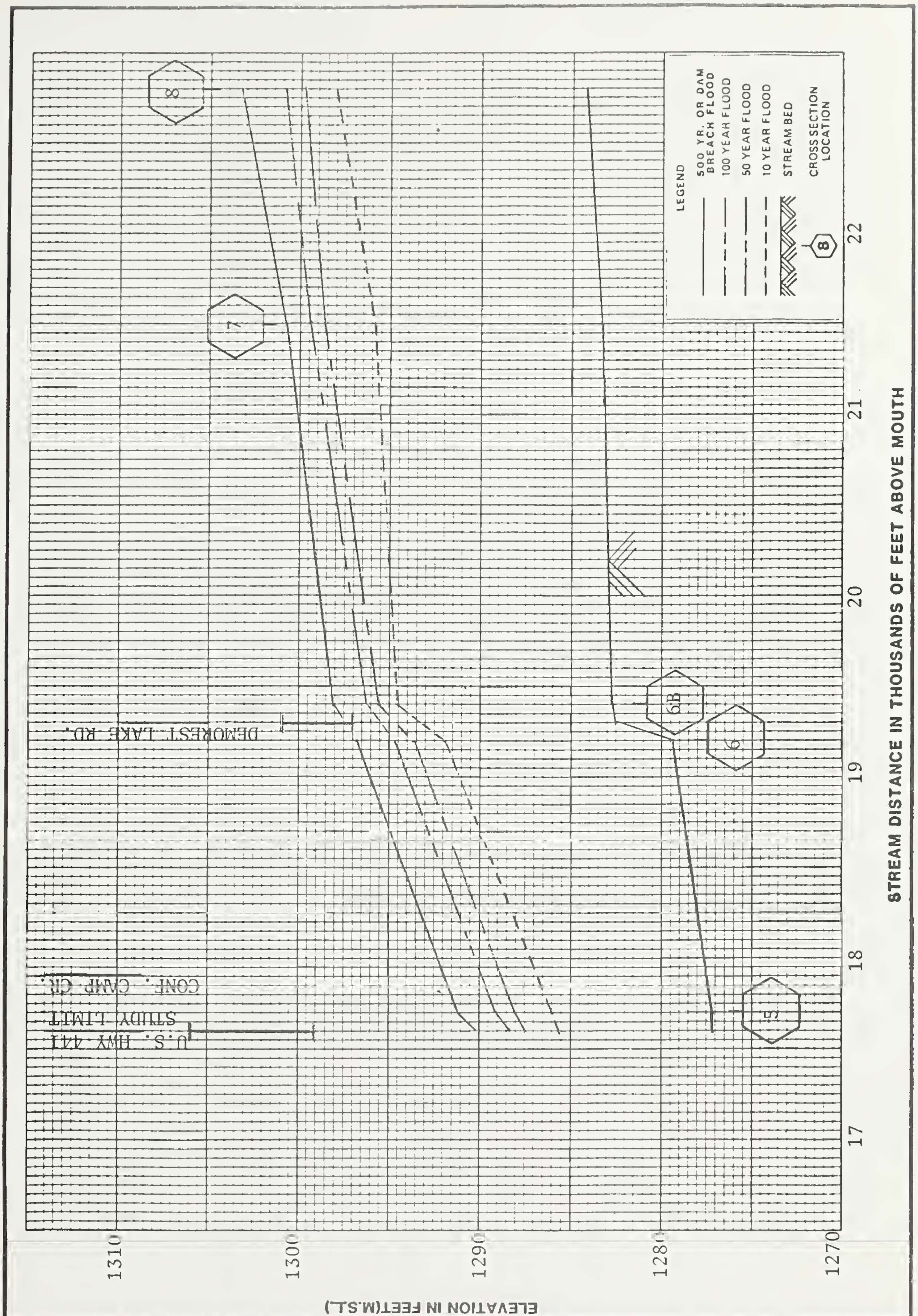
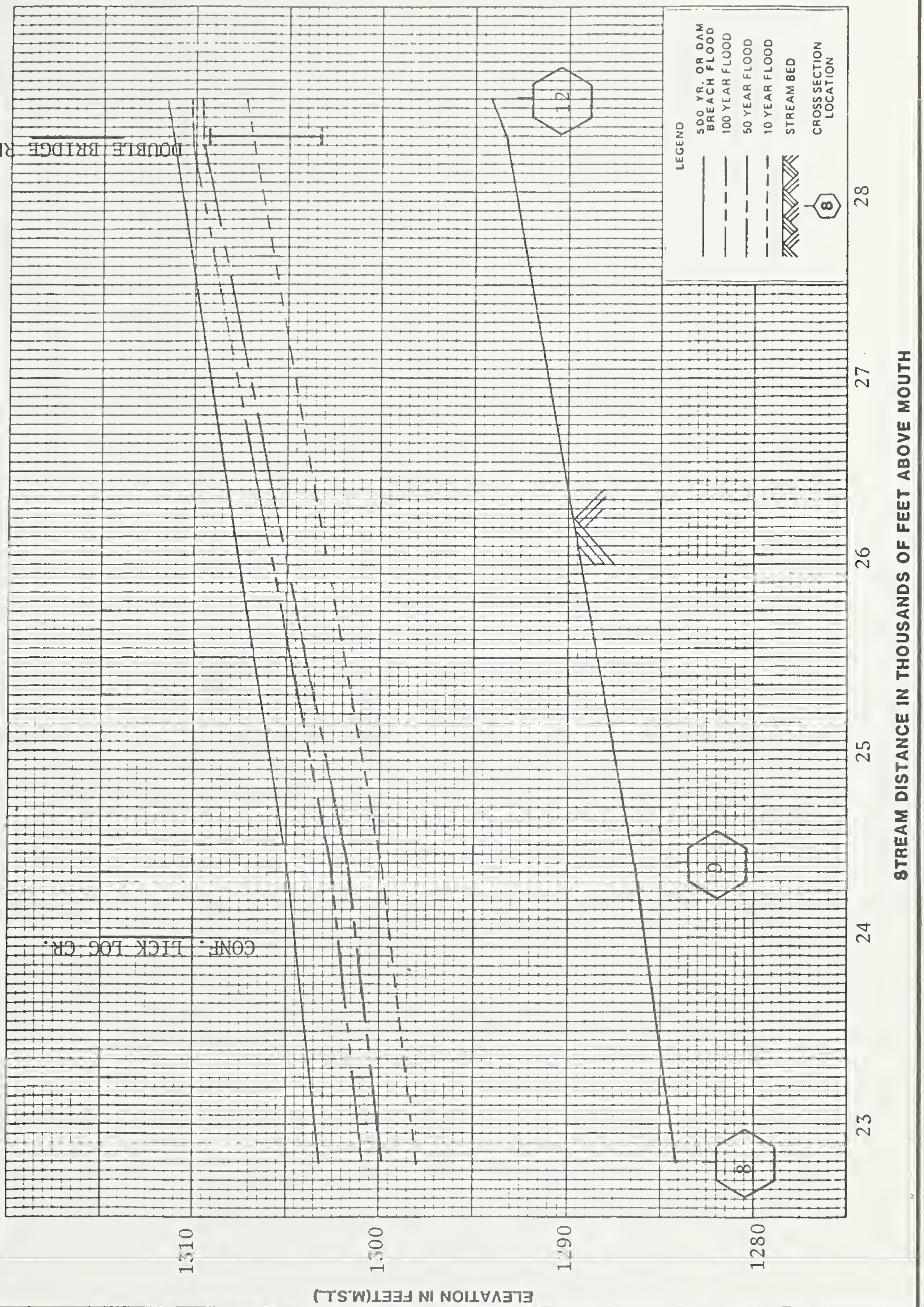
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

SOUTH FORK LITTLE MUD CREEK



31	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** HAZEL CREEK



32	U S DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	FLOOD PROFILES HAZEL CREEK

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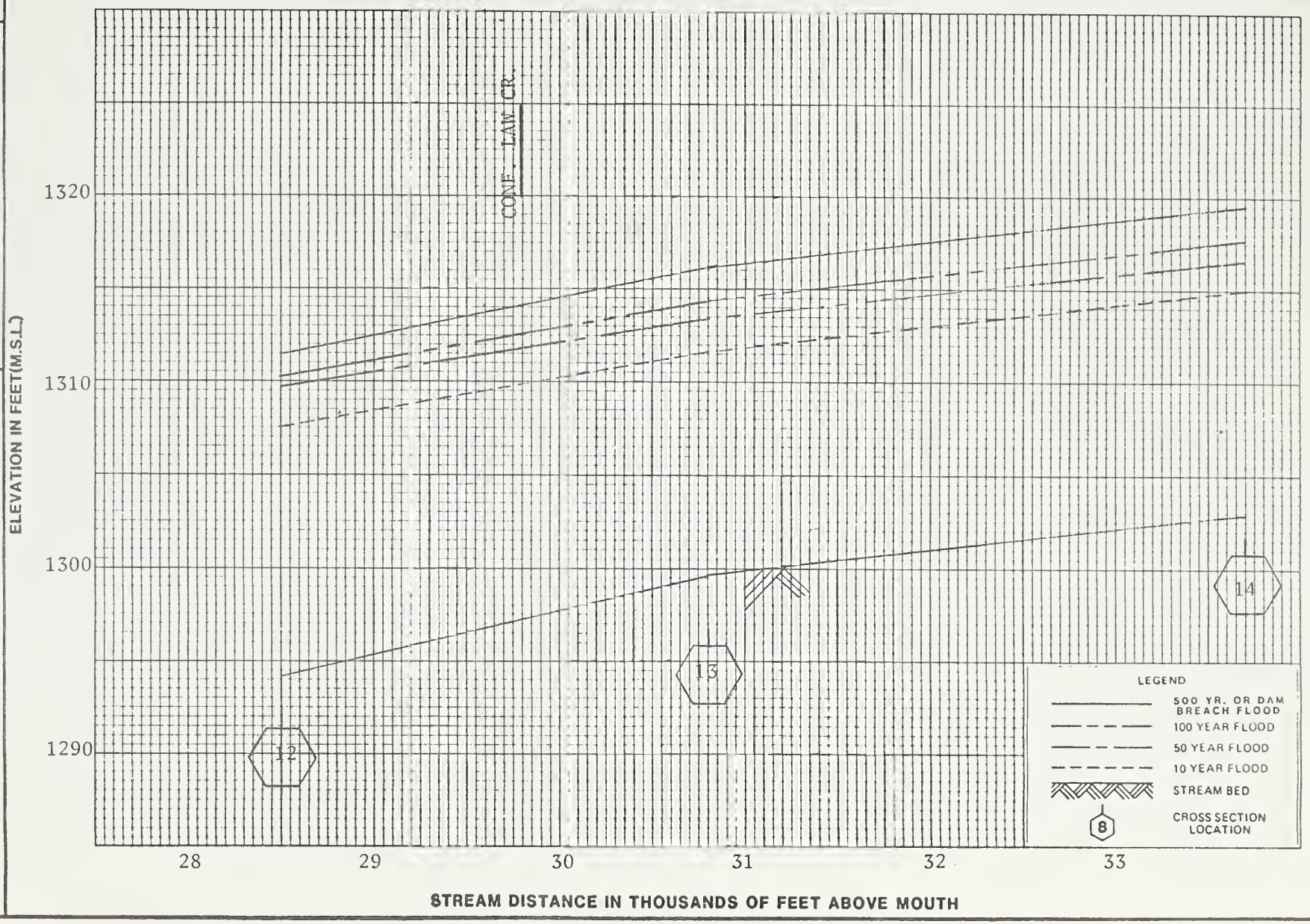
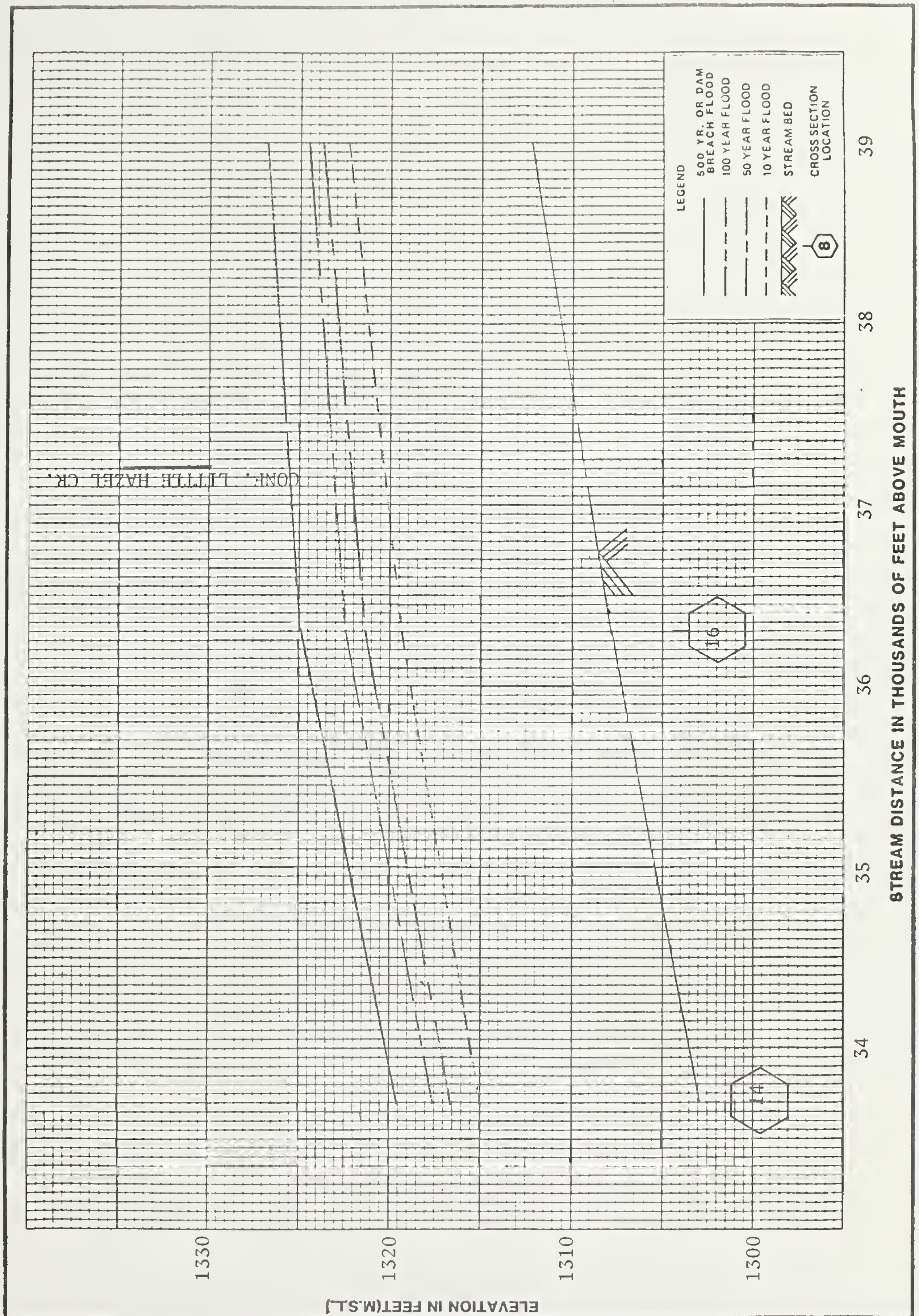
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

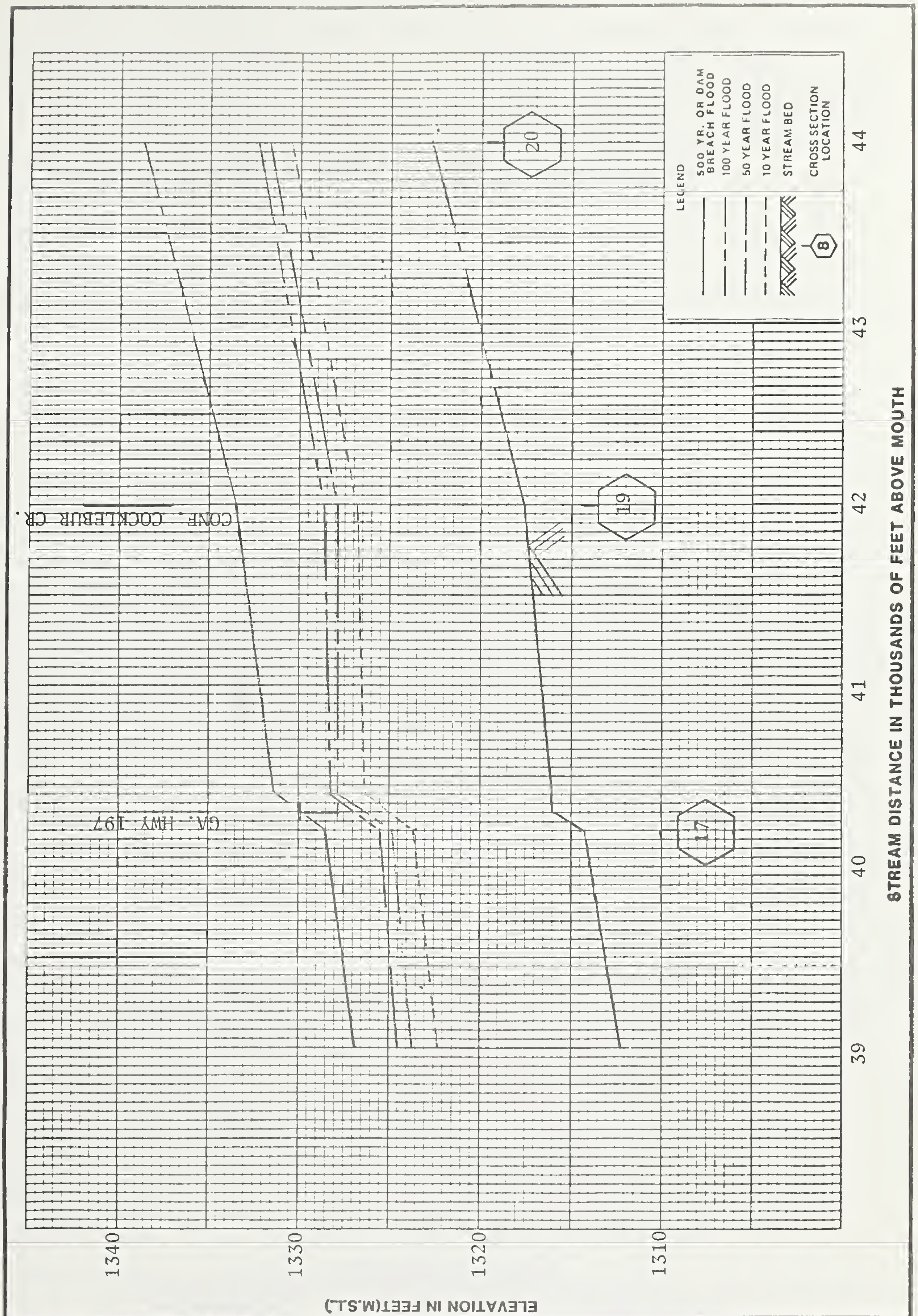
HAZEL CREEK

FLOOD PROFILES





34	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** HAZEL CREEK

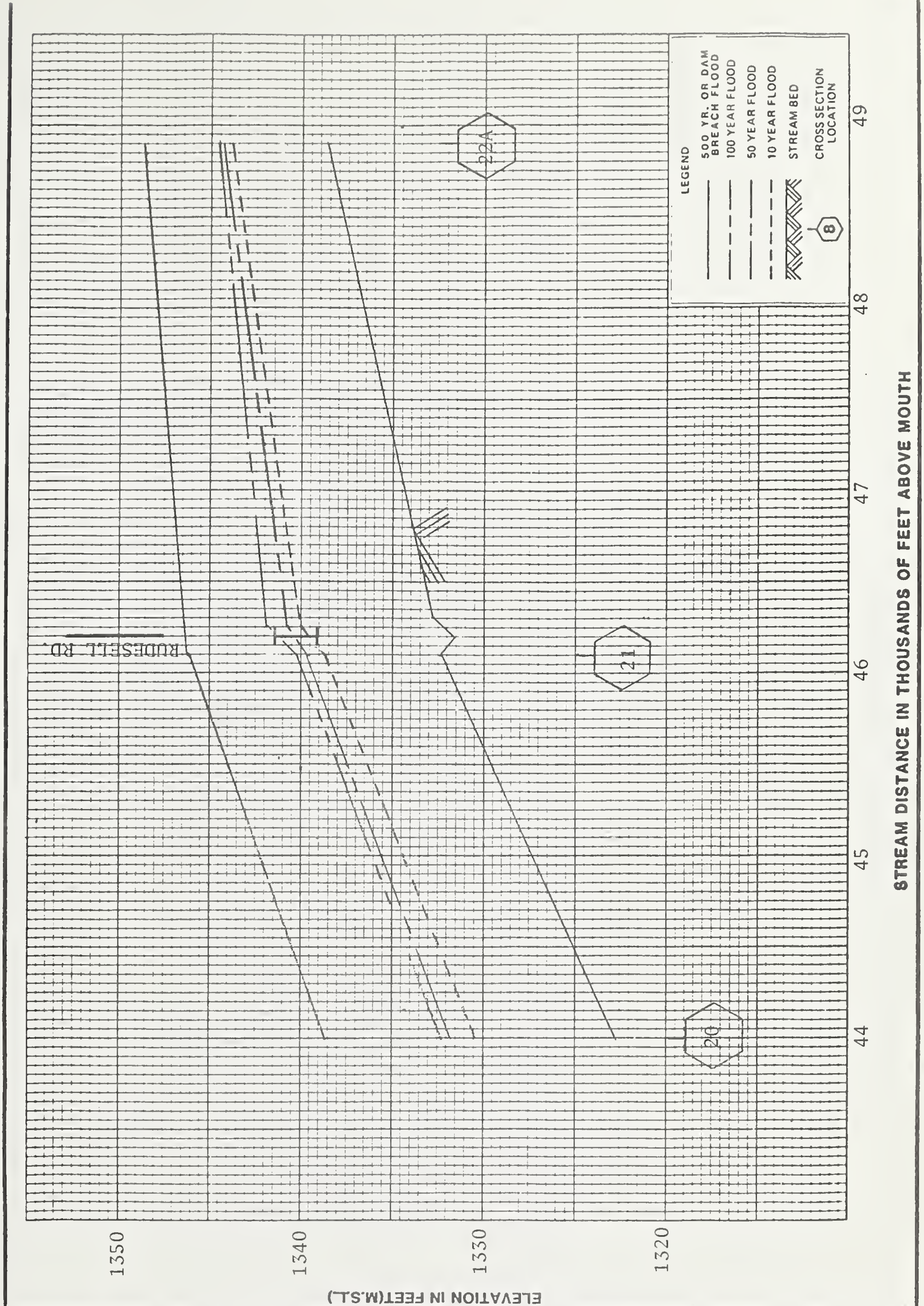


U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

HAZEL CREEK



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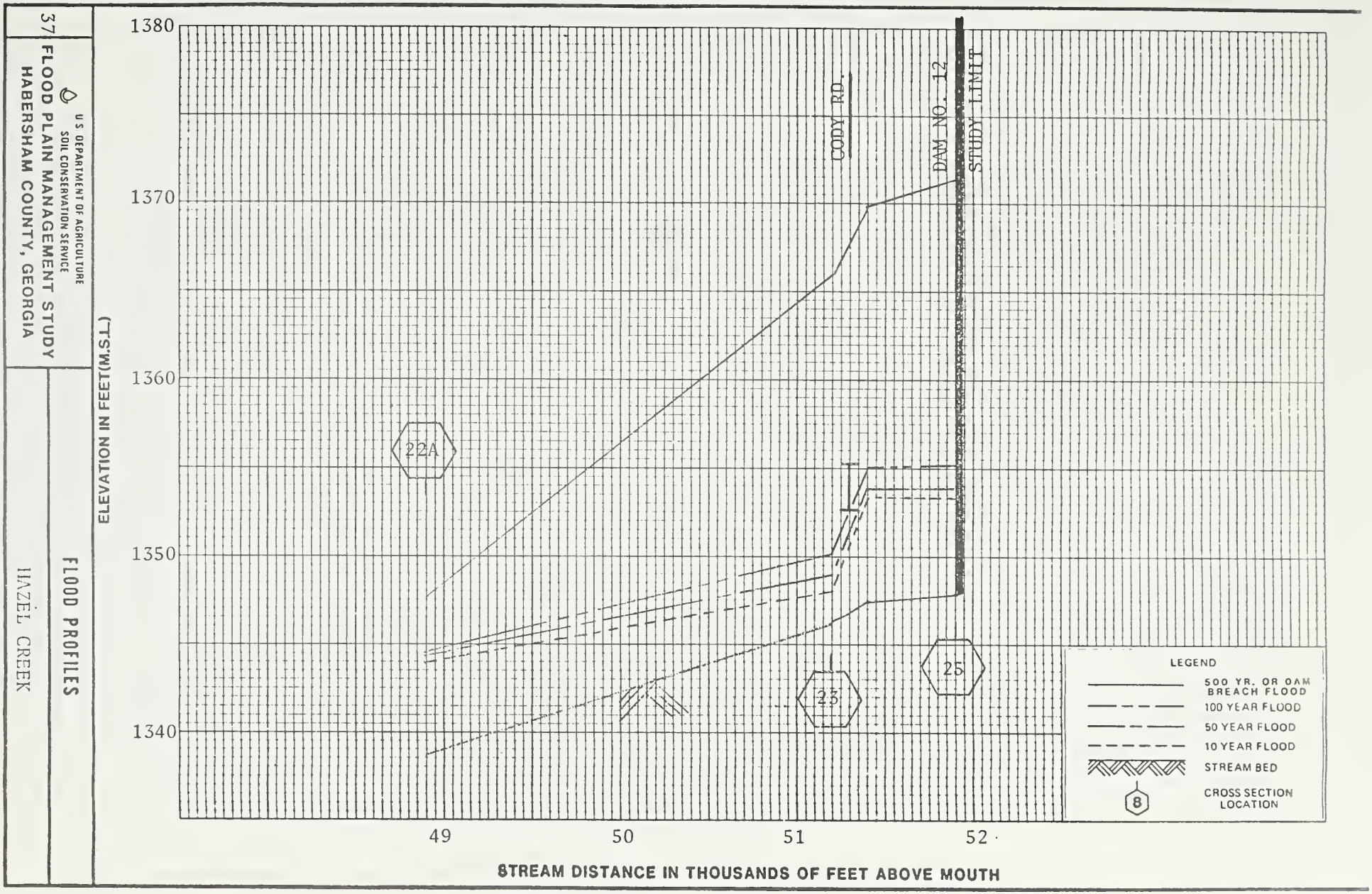
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

HAZEL CREEK



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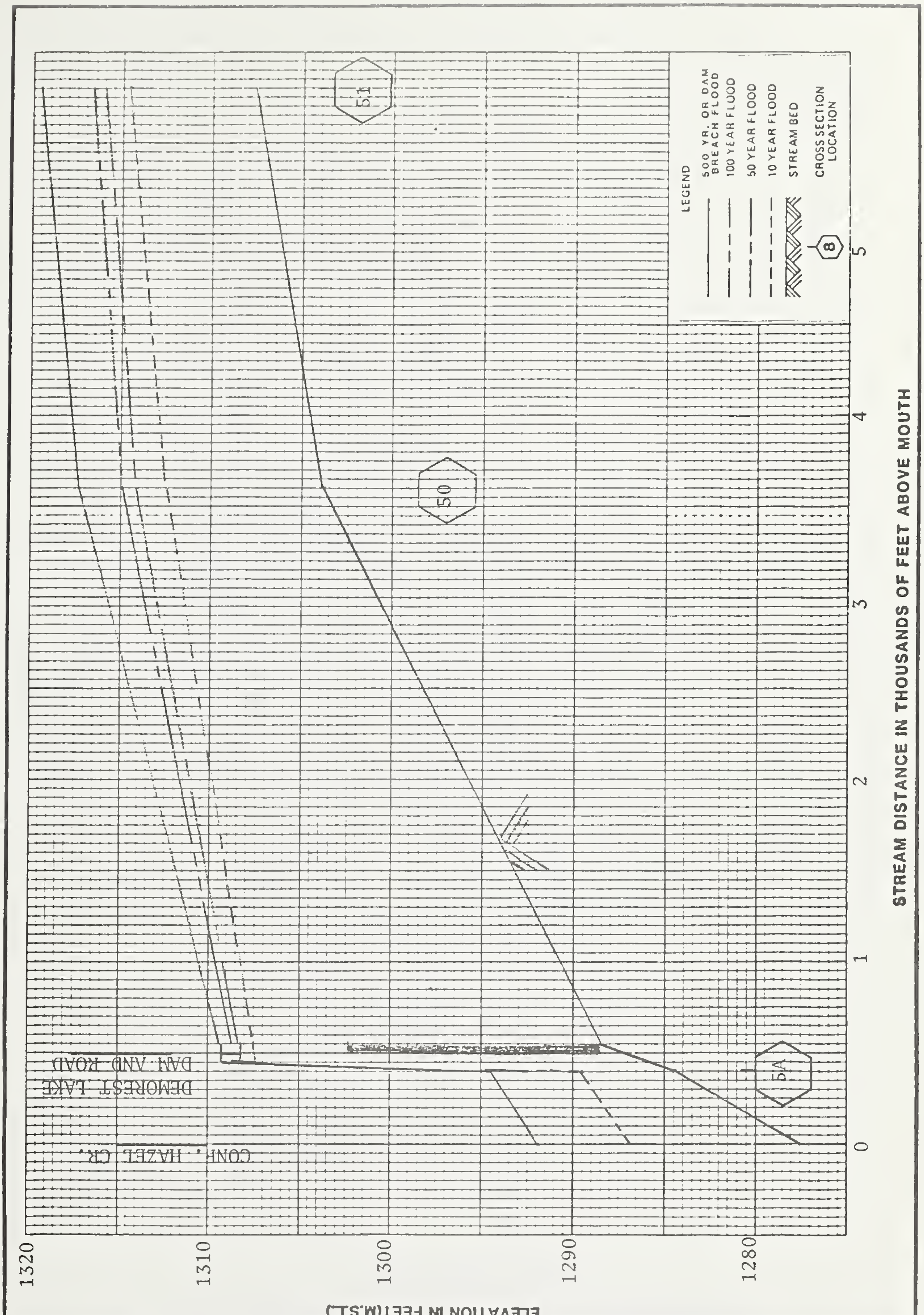
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

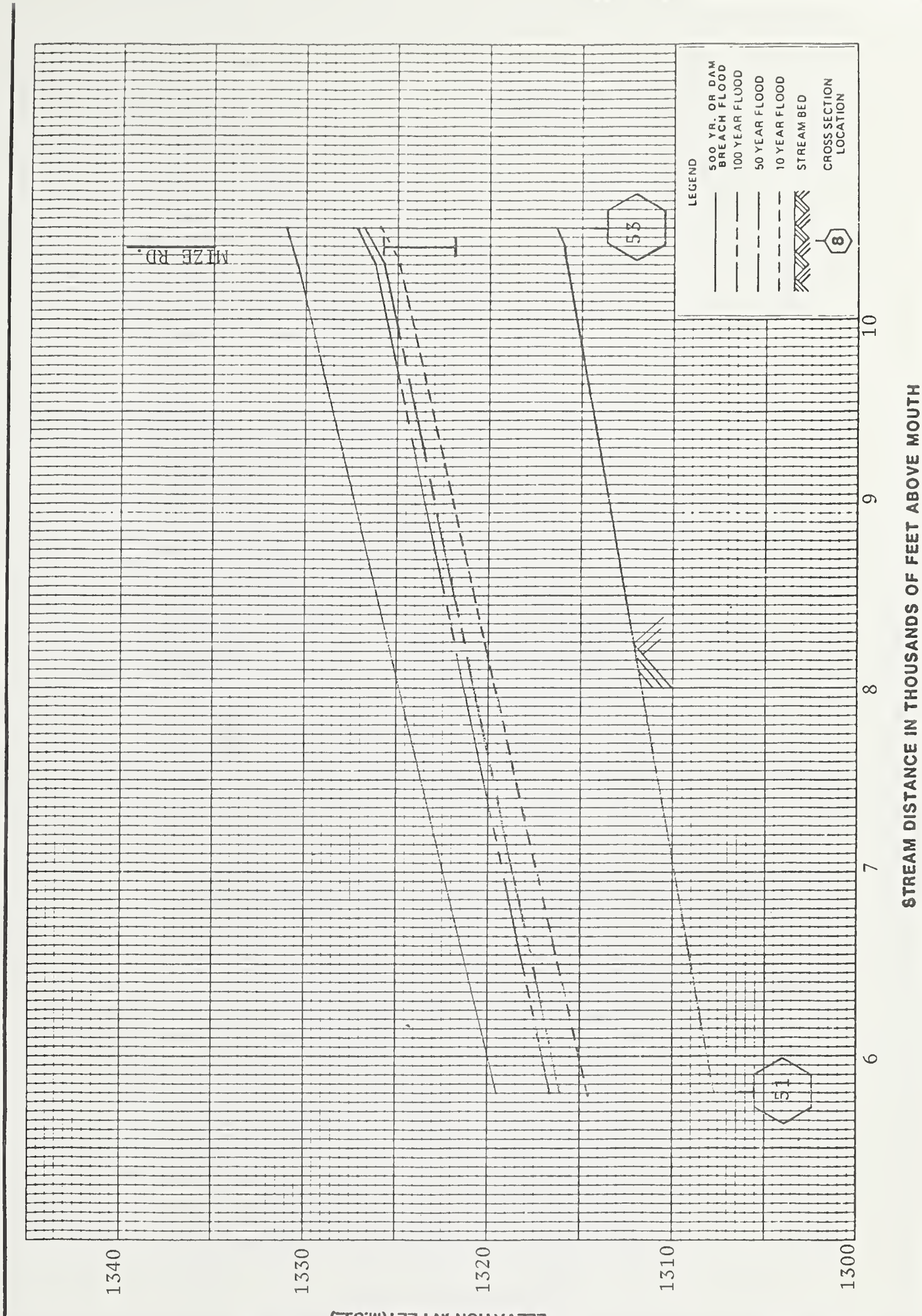
FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

HAZEL CREEK



38	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE **FLOOD PLAIN MANAGEMENT STUDY** **HABERSHAM COUNTY, GEORGIA**	**FLOOD PROFILES** CAMP CREEK



39	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE FLOOD PLAIN MANAGEMENT STUDY HABERSHAM COUNTY, GEORGIA	FLOOD PROFILES CAMP CREEK

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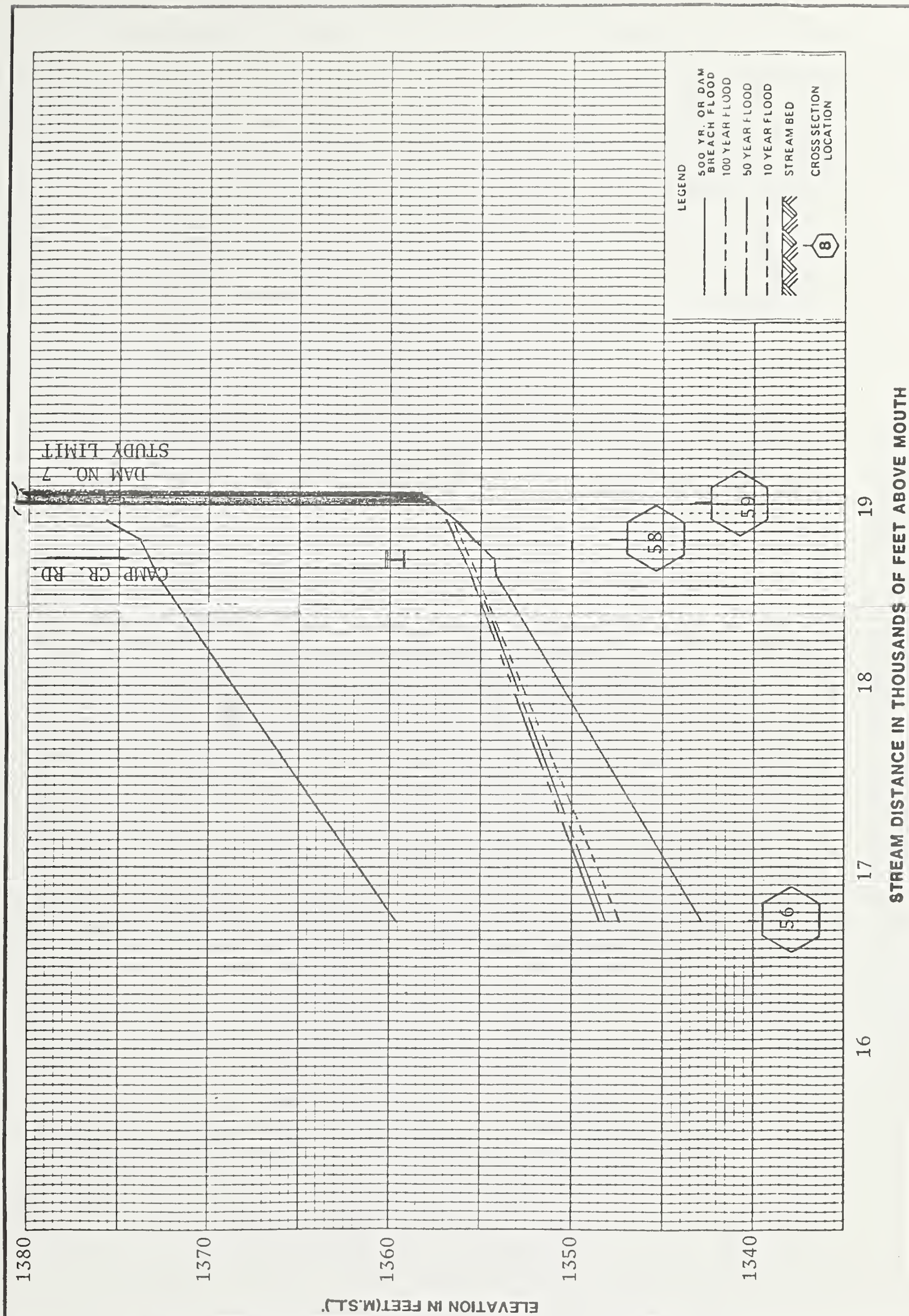
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

CAMP CREEK

FLOOD PROFILES



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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

CAMP CREEK

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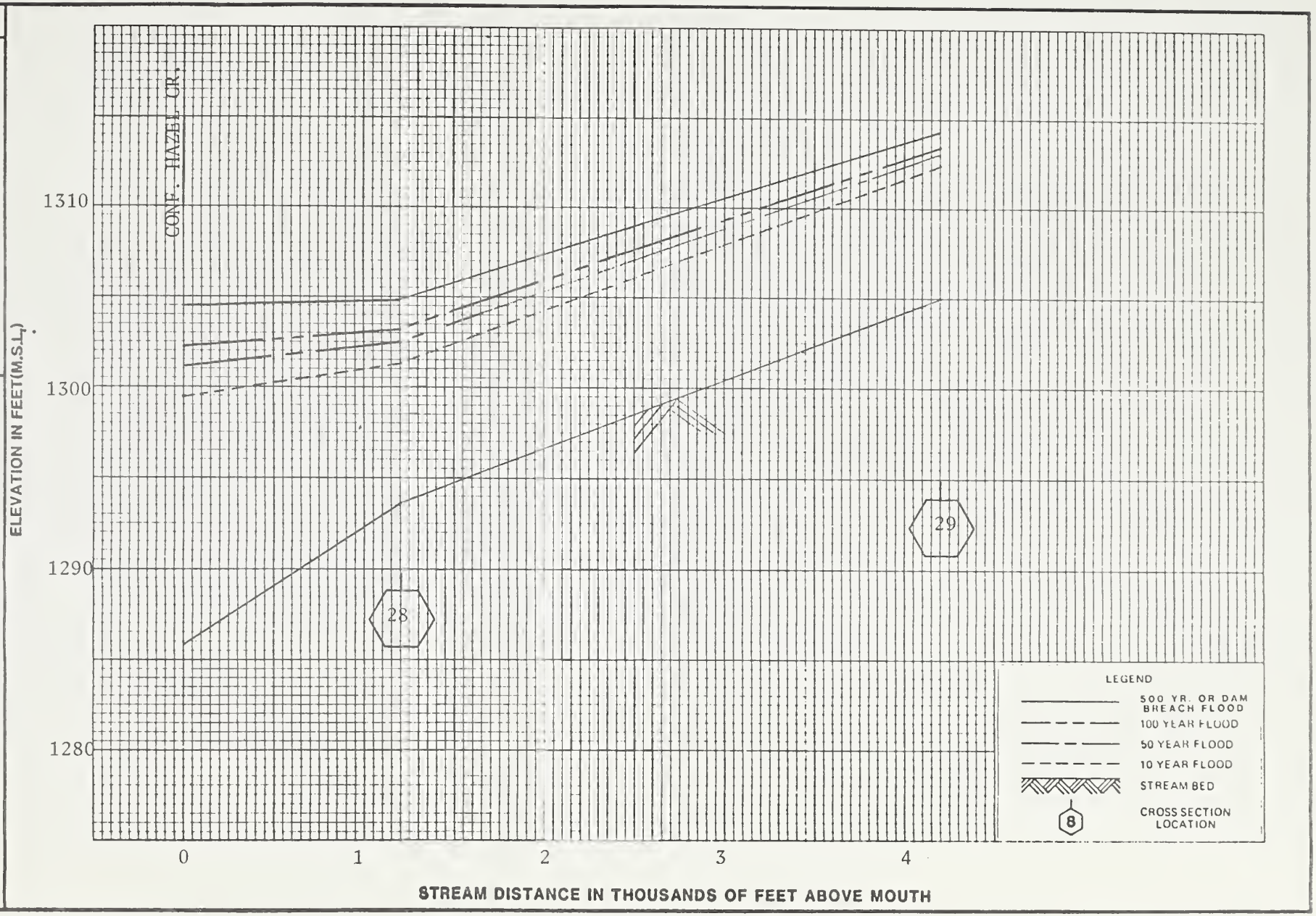
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LICK LOG CREEK



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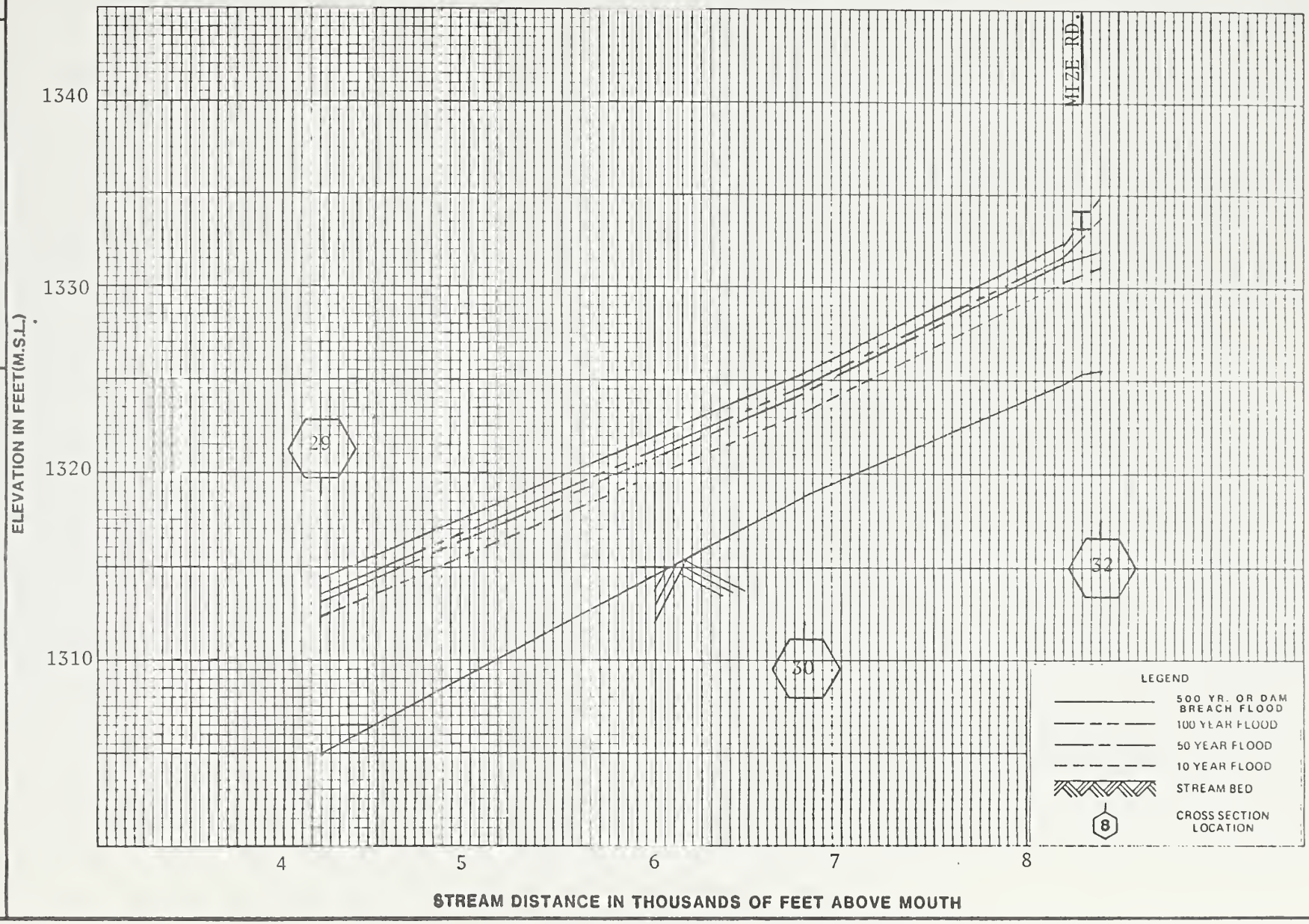
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LICK LOG CREEK



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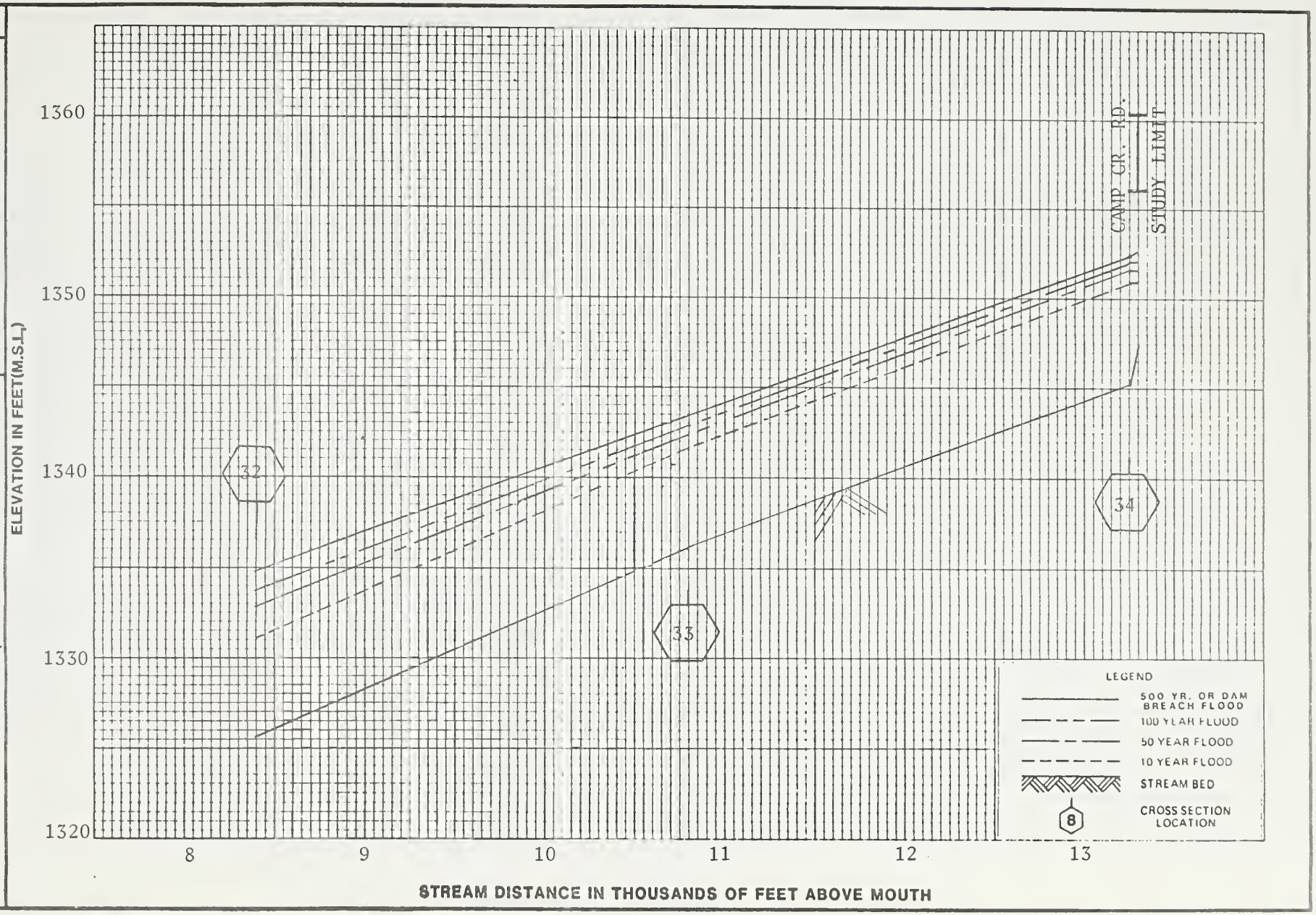
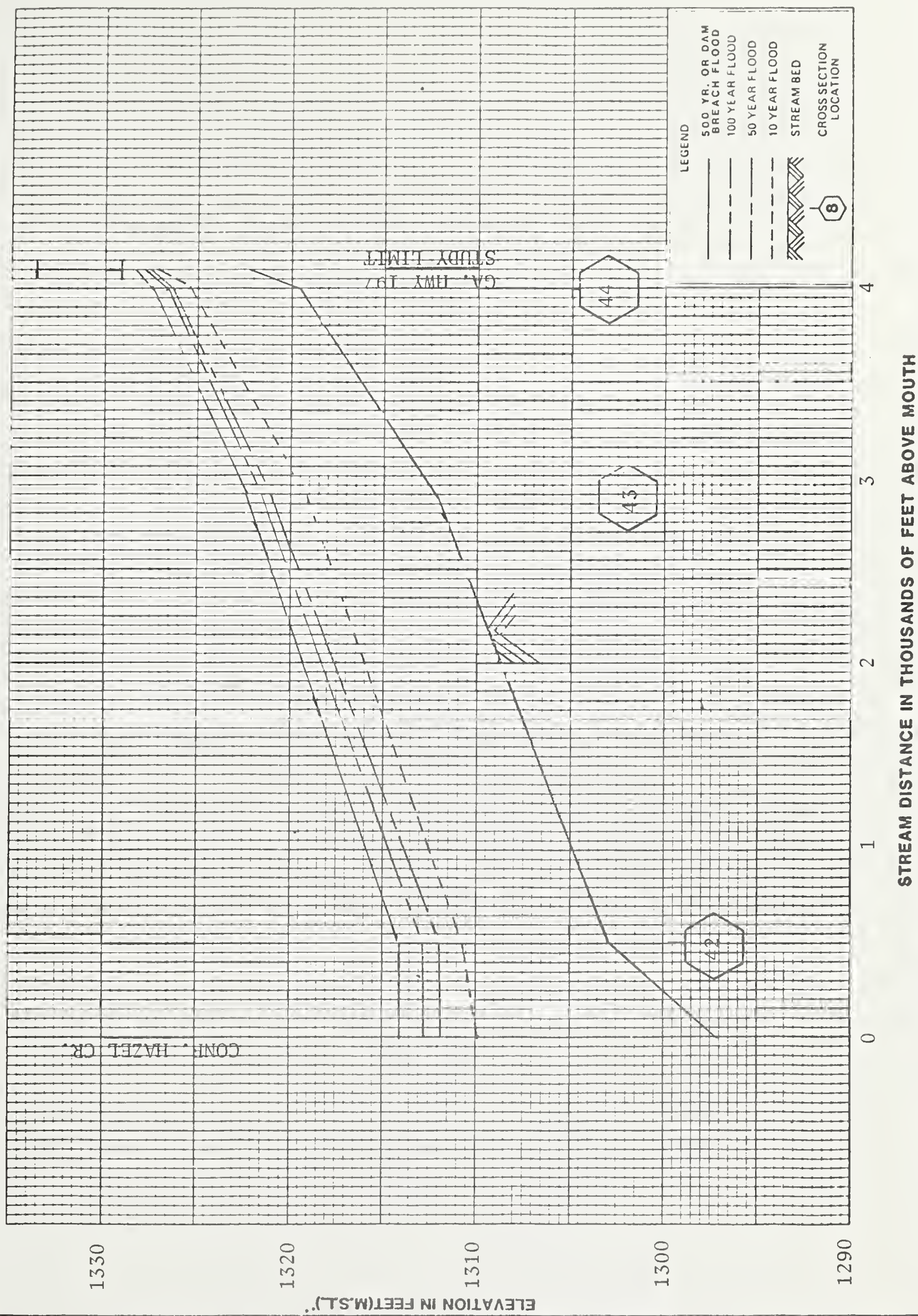
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LICK LOG CREEK





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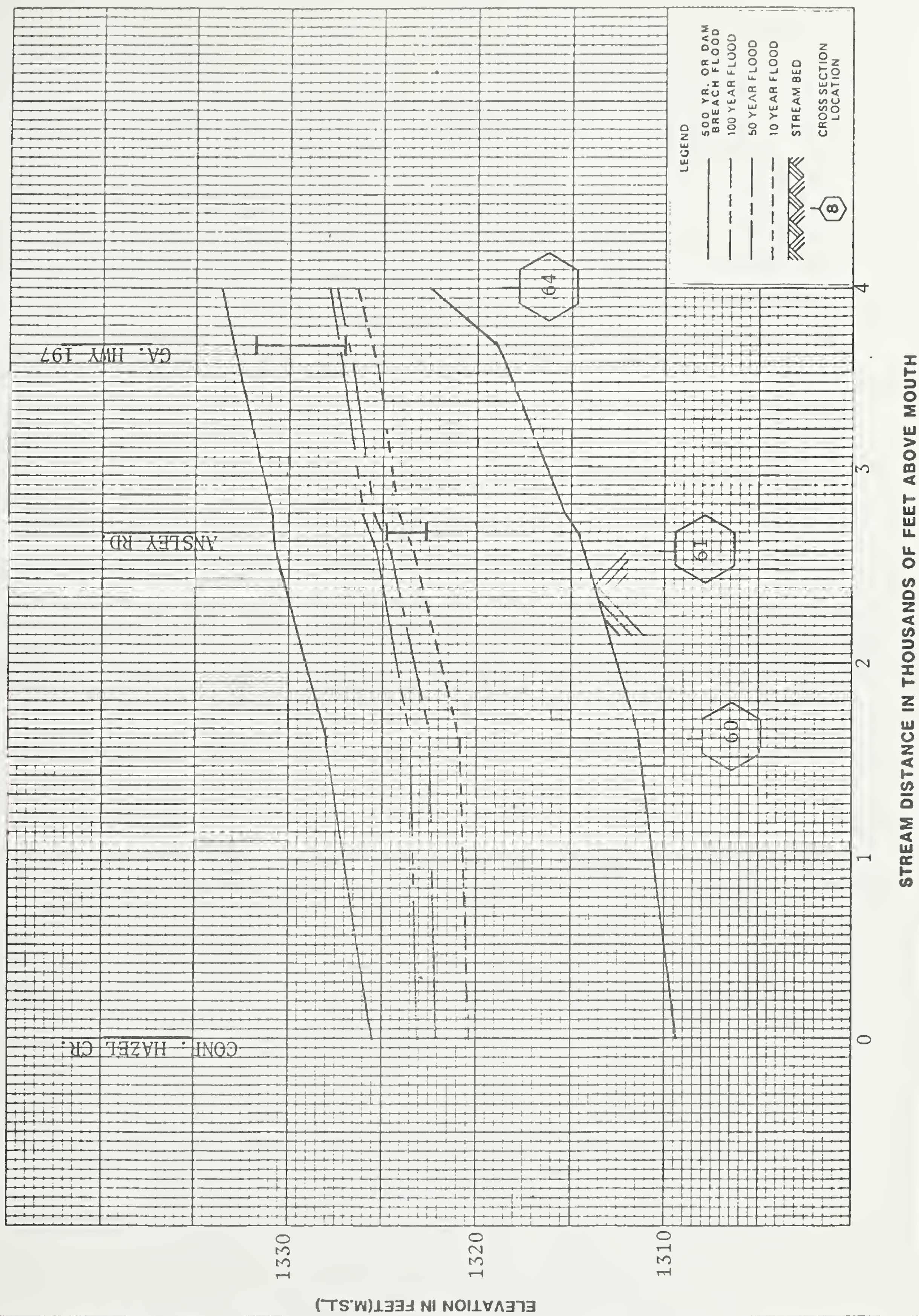

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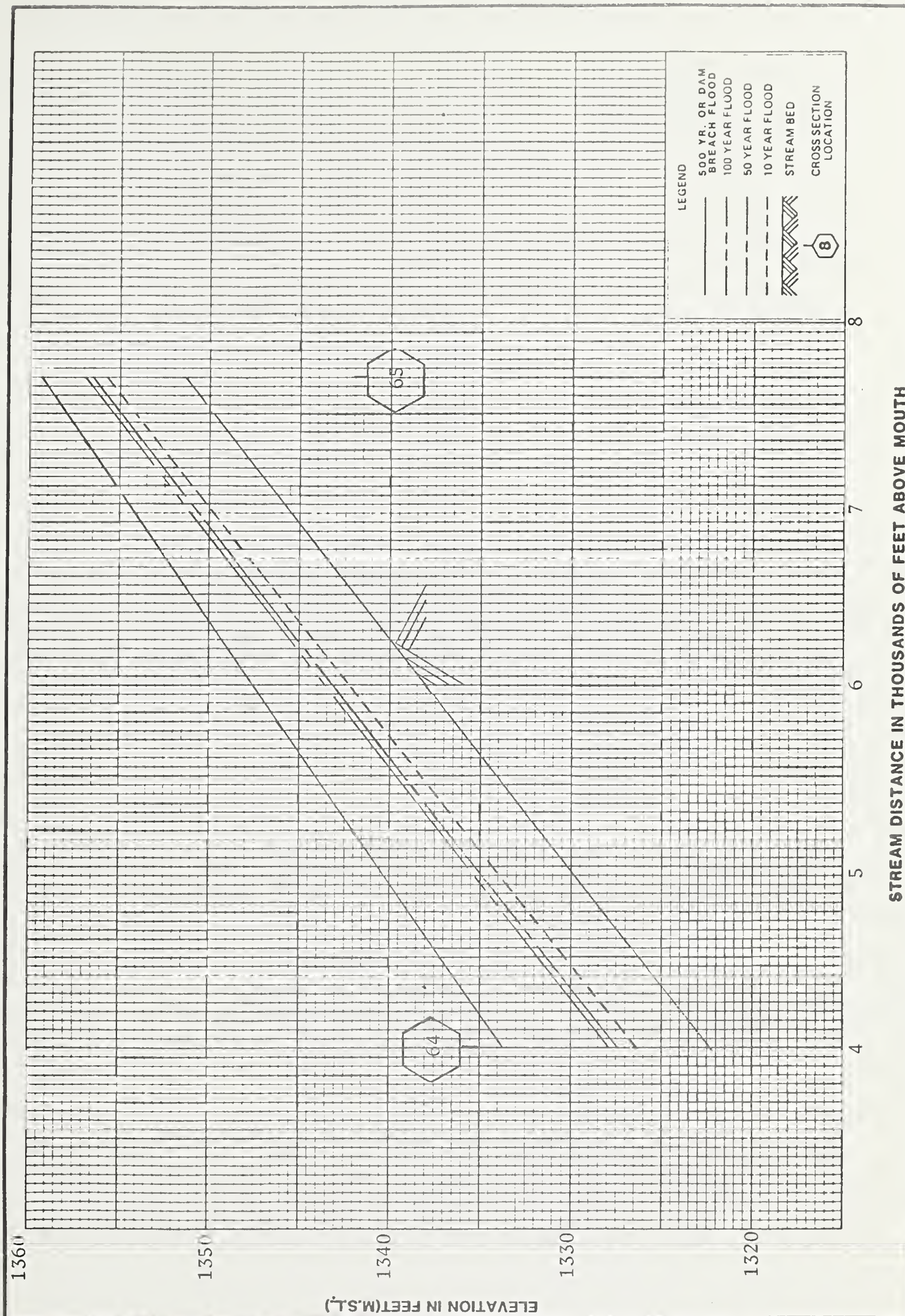
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LITTLE HAZEL CREEK



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SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

FLOOD PROFILES

LITTLE HAZEL CREEK

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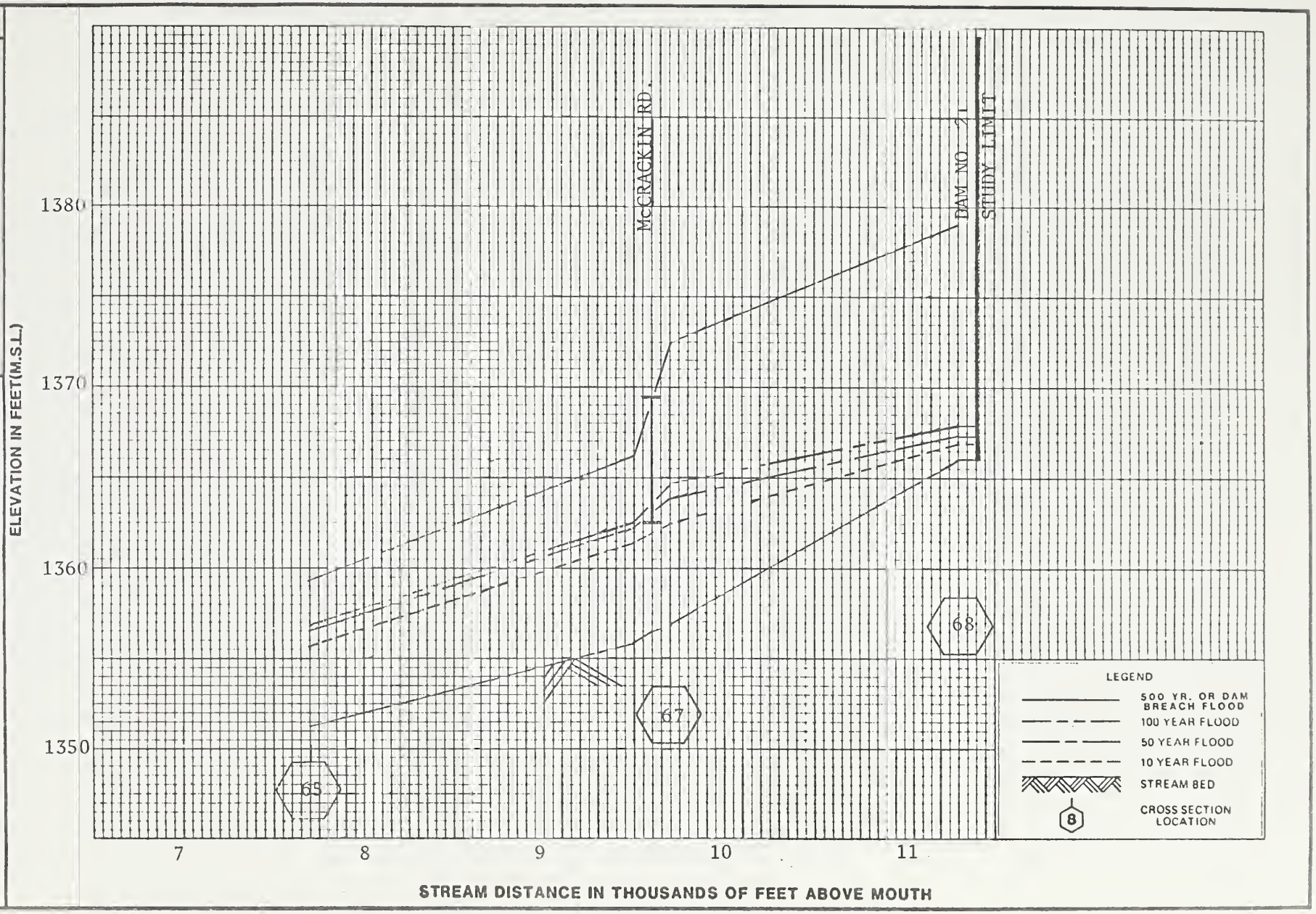
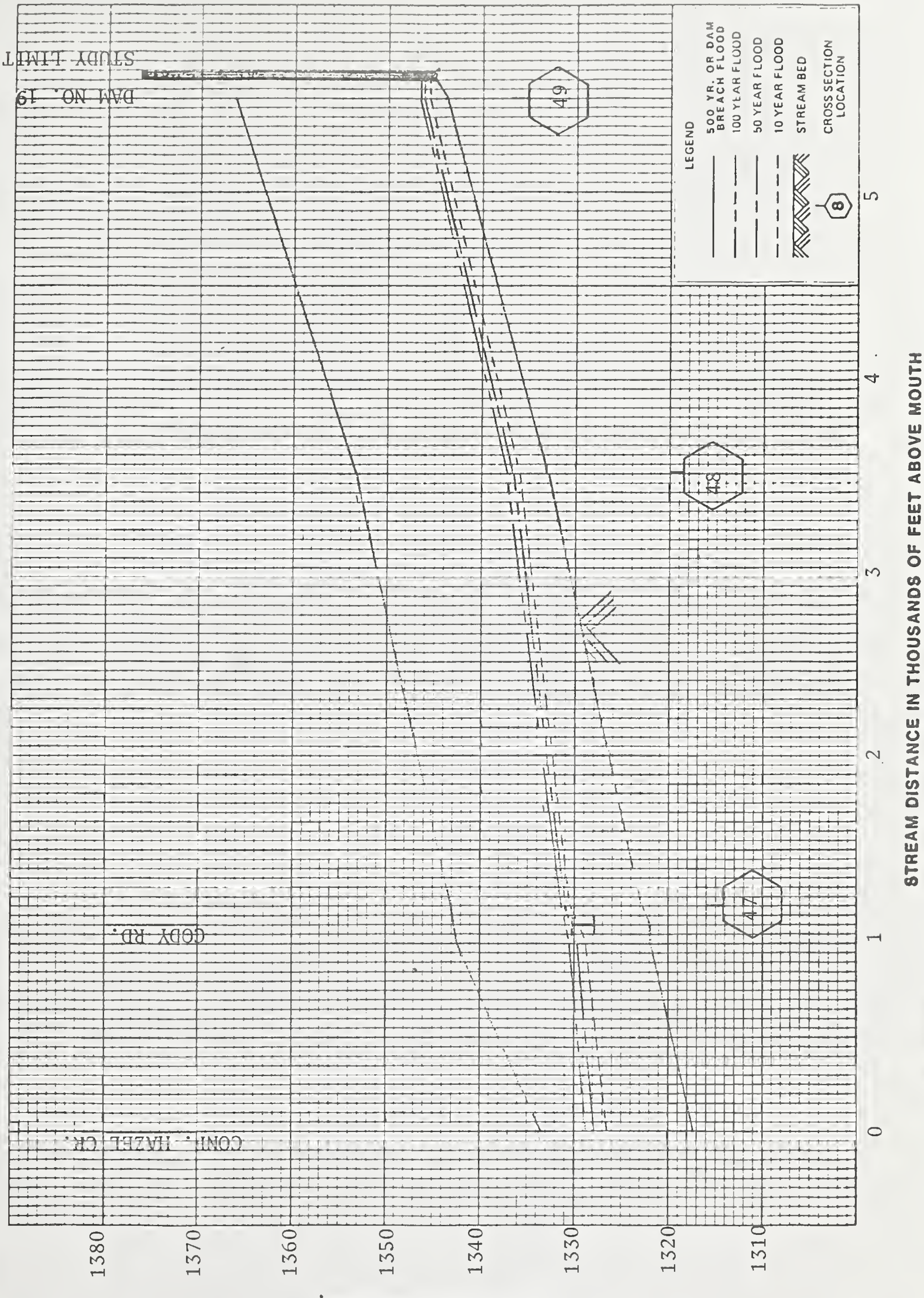
SOIL CONSERVATION SERVICE

FLOOD PLAIN MANAGEMENT STUDY
HABERSHAM COUNTY, GEORGIA

LITTLE HAZEL CREEK

FLOOD PROFILES





49 U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE FLOOD PLAIN MANAGEMENT STUDY HABERSHAM COUNTY, GEORGIA	FLOOD PROFILES COCKLEBUR CREEK

APPENDIX B

APPENDIX B
WATER SURFACE ELEVATIONS
HABERSHAM COUNTY, GEORGIA

Flooding Source and Cross Section	Distance (Thous.Ft)	Flood Peak Elevations (Feet, MSL) by Recurrence Interval (Years) 10	50	100	500 or Dam Breach
Hazel Creek					
5	17.7	1286.1	1288.2	1289.1	1291.1
7	21.5	1295.9	1297.6	1298.4	1300.6
12	28.5	1307.5	1309.6	1310.1	1311.5
16	36.3	1319.3	1321.3	1322.4	1324.9
19	42.0	1326.8	1327.9	1328.6	1333.5
21	46.1	1338.6	1339.6	1340.2	1346.1
Camp Creek					
50	3.6	1312.5	1314.1	1314.9	1317.2
53	10.5	1326.0	1326.9	1327.2	1331.1
Lick Log Creek					
28	1.2	1301.3	1302.5	1303.2	1304.8
33	10.8	1341.6	1342.4	1342.9	1343.5
Law Creek					
43	2.9	1319.1	1321.1	1321.5	1322.3
Little Hazel Creek					
60	1.6	1320.9	1322.5	1323.5	1328.0
64	4.0	1326.4	1327.5	1327.8	1333.7
67	9.7	1362.5	1363.8	1364.7	1372.5
Cocklebur Creek					
47	1.2	1330.6	1331.0	1331.3	1343.0
Mud Creek					
102	31.6	1222.1	1224.6	1225.6	1228.0
108	48.2	1267.2	1268.2	1268.6	1269.7
111	55.8	1281.8	1283.5	1284.5	1289.3
128	65.6	1312.2	1314.5	1315.6	1319.1
131	71.9	1349.8	1350.9	1351.3	1352.0
South Fork Mud Creek					
122	3.3	1338.2	1340.8	1342.0	1346.2
Little Mud Creek					
142	15.9	1189.7	1191.0	1191.5	1193.0
148	30.1	1220.5	1228.1	1232.3	1234.2
152	35.6	1232.5	1234.0	1235.4	1236.7
157	46.5	1276.9	1278.2	1278.9	1282.1
162	53.5	1321.8	1328.3	1332.8	1349.4

WATER SURFACE ELEVATIONS
HABERSHAM COUNTY, GEORGIA

Flooding Source and Cross Section	Distance (Thous.Ft)	Flood Peak Elevations (Feet, MSL) by Recurrence Interval (Years) 10	50	100	500 or Dam Breach
Alto Creek					
180	3.2	1232.7	1234.2	1235.3	1236.7
184	9.6	1270.0	1270.8	1271.1	1272.0
South Fork Little Mud Creek					
171	3.1	1298.1	1301.6	1303.9	1312.8
174	7.4	1332.5	1333.3	1333.5	1334.3

SUMMARY OF DISCHARGES
HABERSHAM COUNTY, GEORGIA

Flooding Source and Location	Total Drainage Area (sq.mi.)	Peak Discharges (cfs) 10-Yr	50-Yr	100-Yr	500-Yr or Dam Breach
Hazel Creek					
U.S. Highway 441	20.3	4,480	6,970	8,300	11,600
Double Bridge Road	16.7	2,860	4,450	5,300	7,700
Georgia Highway 167	7.7	1,180	1,840	2,190	4,860
Rudesell Road	5.1	910	1,390	1,690	10,400
Camp Creek					
Mize Road	5.3	1,190	1,850	2,200	8,060
Camp Creek Road	1.8	16	20	24	23,900
Lick Log Creek					
Mize Road	1.8	700	1,090	1,300	1,820
Law Creek					
Cross Section 42	2.7	960	1,460	1,780	2,490
Little Hazel Creek					
Ansley Road	4.3	880	1,340	1,640	4,250
McCrackin Road	3.2	550	840	1,030	7,420
Cocklebur Creek					
Cody Road	1.9	240	370	450	6,230
Mud Creek					
Crane Mill Road	14.0	2,670	4,310	5,130	7,390
Garrison Road	11.9	2,390	3,860	4,600	6,620
Duncan Bridge Road	8.5	1,920	3,100	3,690	5,310
Hills Mill Road	3.4	1,160	1,880	2,240	3,230
Old Clarkesville-Athens Rd	1.8	810	1,300	1,550	2,230
J. Warren Road	0.9	550	890	1,060	1,530
South Fork Mud Creek					
Old Clarkesville-Athens Rd	2.2	910	1,460	1,740	2,510
J. Warren Road	1.8	810	1,300	1,550	2,230
Little Mud Creek					
Crane Mill Road	15.8	2,920	4,720	5,620	8,100
Smokey Road	10.8	2,290	3,700	4,400	6,340
Fred Wilbanks Road	7.4	1,770	2,860	3,400	4,900
Duncan Bridge Road	4.7	1,370	2,210	2,630	3,790
Georgia Highway 365	1.6	750	1,220	1,450	2,090
Alto Creek					
Georgia Highway 365	2.6	1,000	1,610	1,920	2,760
B.C. Grant Road	1.4	730	1,180	1,400	2,020
South Fork Little Mud Creek					
Georgia Highway 365	1.5	750	1,210	1,440	2,070

APPENDIX C

APPENDIX C
INVESTIGATIONS AND ANALYSES

Survey Procedures

Vertical control was established along stream courses studied using mean sea level datum. Approximately 140 road, bridge, and channel and valley cross sections were surveyed using a telescopic alidade. About 120 elevation reference marks (bench marks) were established. These are listed and described in Appendix D. Distances between cross sections were scaled from aerial photography made by ASCS in October 1980. Surveys were completed in November 1985.

Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the 10-year, 50-year, 100-year, and 500-year recurrence intervals. Discharges are based on statistical analysis of discharge records covering a 35-year period at the Soque River gaging station operated by USGS. This analysis followed the standard log-Pearson Type III method as outlined by the Water Resources Council's Bulletin No. 17B, revised September 1981. The Soque River gage has a drainage area of 156 square miles and is located approximately 2.5 miles west of Demorest.

The 10-year, 50-year, 100-year and 500-year discharges for Hazel Creek and tributaries, reflect the impact of any upstream floodwater retarding structures. Dam breach discharges were computed using the SCS TR 66 Simplified Dam Breach Routing Procedure for Computer. Breaching was assumed to occur with inflow from a 500-year flood. No channel flow exists downstream prior to the breach. The 500-year or Dam Breach Flood shown on the photomaps and flood profiles represents the 500-year flood with no dam breach, or the dam breach flood, whichever is larger. A summary of discharges is presented in Appendix B.

Hydraulic Analyses

Elevation-discharge relationships were established using the SCS water surface profile computer program WSP-2, revised September 1982. The solution consists of backwater computations based on Bernoulli's equation for the total energy at each cross section and Manning's formula for the friction head loss between cross sections. Manning's roughness coefficients ("n" values), which represent the characteristics of the channel and overbank areas, were based on field reconnaissance.

Water surface elevations at road crossing structures were computed assuming unobstructed bridge flow conditions. No consideration was made for openings blocked by debris, future flood plain filling, or other encroachments which could increase flood stages. Selected water surface elevations are tabulated in Appendix B.

The delineated flood hazard area limits are the irregular lines conforming to the area subject to inundation by the 100-year and 500-year or dam breach floods as shown on photomaps in the report. The 100-year and 500-year or dam breach flood hazard area widths coincide respectively with the computed 100-year and 500-year or dam breach water surface profile at cross sections locations. Delineations of flood hazard areas between cross sections were made by using stereoscopic aerial photographs and USGS 7½-minute quadrangle sheets.

Natural Values

The 100-year flood plain as described in this study was the base for evaluation of natural resources present.

Detailed study of natural resources and their related values was not conducted. A general field reconnaissance and literature search were conducted. Literature search provided some specific information for this study. Field reconnaissance was made in conjunction with current aerial photos, soil maps, and U.S. Geological Survey quadrangle maps to describe typical plant communities and stream and flood plain habitats. This information should be used only to point out areas where additional surveys should be conducted before an area is developed.

GLOSSARY OF TECHNICAL TERMS

Cross Section (stream or valley) - The shape of a channel, stream, or valley, viewed across the axis. In this study it is determined by a line approximately perpendicular to the main path of water flow, along which measurements of distance and elevation are taken to define the cross sectional area.

Drainage Area - The area drainage into a stream at a given point. The area may be of different sizes for surface runoff, subsurface flow, and base flow, but generally the surface runoff area is used as the drainage area.

Flood - A general and temporary condition of partial or complete inundation of normally dry land areas from: 1) the overflow of inland or tidal waters; and 2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Crest - The maximum stage or elevation reached by the waters of a flood at a given location. The discharge at this stage would be the peak discharge.

Flood Plain - The areas adjoining a river, stream, watercourse, ocean, lake, or other body of standing water that have been or may be covered by flood-water.

Flood Hazard Area - Same as flood plain.

Flood Profile - A graph showing the relationship of water surface elevation to location, the latter often expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood.

100-year Flood - (Base Flood) A flood having a one percent chance of being equalled or exceeded in any given year.

500-year Flood - A flood having a 0.2 percent chance of being equaled or exceeded in any given year.

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APPENDIX D

APPENDIX D
ELEVATION REFERENCE MARKS
(BENCH MARKS)

Identification	Elevation (Feet, MSL)	Description
HC- 1	1324.14	Chiseled square on the downstream left Headwall on Mize Road, County Road 68
HC- 2	1301.97	Chiseled square on downstream left wingwall on Demorest Lake Road Bridge
HC- 3	1306.77	Chiseled square on bridge abutment on U.S. Hwy 441 in Demorest, Georgia
HC- 4	1307.72	Chiseled square in center of left upstream bridge abutment looking downstream at the Demorest Dam in Demorest, Georgia
HC- 7	1317.39	Nail & tag HC-7 set in a 18-inch diameter forked pine tree on left bank of Hazel Creek at cross section 7
HC- 8	1323.25	Nail & tag HC-8 set in a 8-inch diameter sourwood tree, in pasture approximately 250 feet right of Hazel Creek at cross section 8
HC-10	1325.96	Nail & tag HC-10 set in 8-inch diameter wild cherry 1 foot above ground at X-Sect 29 approximately 300 feet left of Lick Log Creek looking downstream
HC-14	1373.22	Nail & tag HC-14 set in 14 inch walnut tree approximately 400 feet right of Lick Log Creek at cross section 33
HC-16	1356.63	Nail & tag HC-16 in utility pole upstream from Camp Creek Road. Pole is on left side of Lick Log Creek
HC-17	1331.47	Chiseled square on downstream left side on top of culvert approximately 3 feet from left corner at Hwy 197 crossing on Law Creek
HC-18	1312.93	Nail & tag HC-18 set in a 20 inch pine tree on fence line right 200 feet from Hazel Creek at cross section 9
HC-19	1305.69	Chiseled square on downstream left side of culvert on Double Bridge Road
HC-20	1309.13	Nail & tag HC-20 set in 30 inch beech tree approximately 100 feet from property line upstream 20 feet left of Hazel Creek looking downstream

Identification	Elevation (Feet, MSL)	Description
HC-21	1314.91	Nail & tag HC-21 set in 28 inch popular tree 1 foot above ground approximately 75 feet left of Hazel Creek and 150 feet south of fence line at cross section 14
HC-22	1319.68	Nail & tag HC-22 set in 25 inch white oak tree on property line approximately 50 feet left of Hazel Creek at cross section 16
HC-23	1319.70	Nail & tag HC-23 set in utility pole with single transformer approximately 800 feet downstream from Ansley Road Bridge. Pole is 100 feet left of Little Hazel Creek.
HC-24	1340.87	Nail & tag HC-24 set 4.3 feet above ground in 14 inch sourwood tree approximately 50 feet downstream of Old Mill Building at cross section 64 on left bank of Little Hazel Creek.
HC-26	1324.32	Nail & tag HC-26 set in a 26 inch popular tree approximately 50 feet left of Cocklebur Creek at cross section 19.
HC-27	1335.10	Nail & tag HC-27 set in a 16 inch white oak tree at fence gate 20 feet from centerline of Cody Road at Cocklebur Creek.
HC-28	1339.89	Nail & tag HC-28 set in 18 inch popular tree 60 feet left of Cocklebur Creek at cross section 48.
HC-29	1352.77	Nail & tag HC-29 set in 20 inch pine tree 25 feet right of Cocklebur Creek approximately 200 feet below Dam No. 19.
HC-32	1343.89	Nail & tag HC-32 set in a 23 inch sweet gum tree on right bank Hazel Creek, 80 feet downstream from Rudesell Road.
HC-33	1345.78	Nail & tag HC-33 set in 28 inch popular tree approximately 50 feet left of Hazel Creek at X-Sect 22A.
TBM HC-40	1217.98	Nail & tag HC-40 in cross-tie on left downstream side of bridge on Fred Wilbanks Road crossing on Little Mud Creek.
HC-41	1230.13	Nail & tag HC-41 set in downstream left runner of bridge at Creasy Patch Road crossing on Little Mud Creek.

Identification	Elevation (Feet, MSL)	Description
Hc-42	1231.41	Nail & tag HC-42 set in a cross-tie of wooden bridge on downstream left side. Bridge is at Dirt Road crossing on Alto Creek near cross section 180.
HC-45	1395.73	Nail & tag HC-45 set in a telephone junction box post on downstream side of Industrial Boulevard, 200 feet left of South Fork Little Mud Creek.
HC-46	1302.57	Nail & tag HC-46 set in utility pole #29 80 feet left of South Fork Little Mud Creek on south side Alto Road.
HC-48	1330.34	Nail & tag HC-48 set in utility pole #17 approximately 25 feet north of Alto Road and 100 feet right of Little Mud Creek.
HC-51	1334.39	Nail & tag HC-51 set in 24 inch white pine tree approximately 200 feet left of Camp Creek at cross section 51.
HC-53	1347.31	Nail & tag HC-53 set in 8 inch forked willow tree approximately 150 feet downstream from dirt road and 25 feet left of Camp Creek.
HC-54	1365.92	Nail & tag HC-54 set in 18 inch sweet gum tree approximately 150 feet upstream of Camp Creek Road and 100 feet left of Camp Creek.
HC-59	1247.93	Nail & tag HC-59 set in utility pole approximately 85 feet right of Little Mud Creek and 100 feet upstream from Charley Davis Road.
HC-61	1282.47	Nail & tag HC-61 set in 16 inch maple tree 10 feet right of Little Mud Creek at cross section 158.
HC-63	1277.46	Nail & tag HC-63 set in forked sweet gum tree approximately 100 feet right of Alto Creek and 40 feet downstream from B.C. Grant Road.
HC-64	1305.99	Nail & tag HC-64 set in 28 inch popular tree approximately 50 feet right of Little Mud Creek and 120 feet downstream of A. Wilbanks Road.
HC-66	1364.91	Chiseled square on the downstream left abutment culvert on McCrackin Road at McCrackin Road crossing of Little Hazel Creek.

Identification	Elevation (Feet, MSL)	Description
HC-68	1388.74	Nail & tag HC-68 set in utility pole #1 approximately 75 feet downstream of culvert on left bank Little Mud Creek at cross section 165.
HC-70	1359.96	Nail & tag HC-70 set in forked sycamore tree approximately 200 feet downstream of J. Warren Road and 200 feet left of South Fork Mud Creek.
HC-74	1342.70	Chiseled mark on downstream left abutment of culvert on Old Clarkesville-Athens Road crossing on South Fork Mud Creek.
HC-77	1297.57	Nail & tag HC-77 set in forked walnut tree approximately 300 feet downstream from Hills Mill Road on left bank Mud Creek.
HC-78	1336.95	Chiseled corner on downstream left top of abutment at Old Clarkesville-Athens Road crossing on Mud Creek.
HC-79	1356.61	Chiseled corner on downstream left top of culvert at J. Warren Road crossing of Mud Creek.
HC-81	1180.27	Elevation set on top of 5/8 inch bolt head on upstream left walkway of Crane Mill Road bridge over Little Mud Creek.
HC-83	1241.26	Elevation set on 5/8 inch bolt head in concrete on upstream left bridge walkway. Crane Mill Road crossing on Mud Creek.
HC-85	1199.07	Chiseled corner on left downstream top to triple culvert of L. Payne Road crossing of Little Mud Creek.
HC-87	1220.04	Chiseled corner on downstream left head wall of culvert on Alto-Mud Creek Road crossing of Little Mud Creek.
HC-89	1242.81	Chiseled corner of left downstream top culvert on Garrison Road crossing of Mud Creek.
HC-91	1274.54	Chiseled corner of downstream left top of triple culvert at Duncan Bridge Road crossing on Mud Creek.
HC-93	1315.96	Chiseled corner on downstream left top of culvert at Old Cleveland Road crossing of Mud Creek.

Identification	Elevation (Feet, MSL)	Description
HC-95	1246.55	Nail & tag HC-95 set in a 8 inch river birch approximately 20 feet right of centerline of Mud Creek at crossing section 106.
HC-96	1250.70	Nail & tag HC-96 set in a 18 inch water oak on left side of Mud Creek at crossing section 107.
HC-104	1245.68	Chiseled corner on downstream right head wall of culvert over Alto Creek at Hwy 365.
HC-106	1297.46	Chiseled corner on downstream left top of double culvert at Hwy 365 crossing of South Fork Little Mud Creek.
HC-107	1322.09	Chiseled corner on upstream left headwall on Ga. Hwy 365 crossing on Little Mud Creek.
HC-108	1380.23	Chiseled corner on downstream left top of head wall at Hwy 365 crossing on Mud Creek.
HC-110	1333.71	Nail & tag HC-110 set in 18 inch popular tree on right bank of South Fork Little Mud Creek at cross section 174.
HC-111	1213.36	Nail & tag HC-111 set in 14 inch pine tree approximately 50 feet right of Little Mud Creek at cross section 145.
HC-112	1206.83	Nail & tag HC-112 set in 18 inch crooked pine approximately 90 feet right of Little Mud Creek at cross section 142.
HC-114	1223.77	Nail & tag HC-114 set in 12 inch walnut tree on right bank Mud Creek, and approximately 350 feet from laying house near cross section 102.
HC-115	1235.75	Nail & tag HC-115 set in 14 inch red oak tree on fence line approximately 50 feet right of Mud Creek at cross section 103.
HC-117	1281.90	Nail & tag HC-117 set in 30 inch forked popular tree approximately 80 feet right of Mud Creek at cross section 111.
HC-118	1288.84	Nail & tag HC-118 set in cluster of river birch trees on right side Mud Creek at cross section 112.
HC-119	1267.49	Nail & tag HC-119 set in 20 inch popular tree 15 feet right of Mud Creek looking downstream (at cross section 103).

Identification	Elevation (Feet, MSL)	Description
PBM 068-20 (S.H.D.)	1295.69	From the post office in Baldwin, go south on U.S. 23 for 1.3 miles to intersection of paved county road; then west for 1.8 miles to station. Station is located 29.0 feet southwest of the centerline of the county road; and 225.9 feet west of the P.I. of dirt road leading east of county road. (Near Duncan Bridge Road crossing on Little Mud Creek).
PBM 068-38 (D.O.T.)	1334.118	Fron the post office in Demorest, Georgia, go north on U.S. 441 for 0.50 mile to Demorest Lake Road. Go east for 1.4 miles to Mize Road, go north on Mize Road for 0.70 mile to the station. The Station is a brass disk set in the top of the east guard rail of a bridge over Lick Log Creek. It is 11.5 feet west of the southeast end of the bridge.
PBM 068-40 (D.O.T.)	1330.914	Fron the courthouse in Clarkesville, go south on U.S. 441 for 1.05 miles to a Y in the road at the junction of S.R. 197 go southeast on S.R. 197 for 2.85 miles to the station. The Station is a standard brass disk set in the top of the east headwall of a triple 10 foot box culvert over Hazel Creek. It is 0.9 feet south of the northeast end of the headwall, 19.4 feet east of the center of S.R. 197, 0.20 feet below the center of S.R. 197.
PBM H-25	1391.18	2½ miles southeast of Clarkesville, then 1½ miles on dirt road, east then 0.1 mile north on Old Woods Road 3/8 inch iron pin set in concrete on east edge of Old Woods Road, 2 feet south of power pole, approximately 200 feet south of Dam #12.